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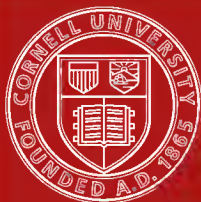
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INTRODUCTORY
EDUCATIONAL PSYCHOLOGY



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INTRODUCTORY

Educational Psychology

A BOOK FOR TEACHERS
IN TRAINING

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PREFACE

The following treatise is prepared, primarily, for the use of student teachers in Professional Training Schools, and is intended to be introductory and accessory to the class-room work and to the reading of educational text-books.

An effort has also been made to render the treatment sufficiently elementary, sequential and complete to enable the reader, without assistance, to gain a practical working knowledge of the solution of the fundamental problems of Education.

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INTRODUCTORY EDUCATIONAL PSYCHOLOGY

CHAPTER I

Conditions Which Render School Education Possible and Desirable

I.—THE CHILD:

A child, born in a civilized community and continuing to develop under ordinary social conditions, will possess, on reaching maturity (say at twenty years of age), some characteristics similar to those which he possessed at birth, and others dissimilar. State probable points of resemblance.*

Give examples of changes which, in all probability, will have taken place.

The following phases are suggested for consideration:

Appearance, weight, size, form, strength, muscular activities and adjustments, appetites, desires, impulses, interests, habits, sense discriminations, memory, imagination, thought, knowledge and appreciation of the beautiful, the good, the true, and of the rights and duties of self and others.

* It is not the intention that the reader attempt to give full or final answers to all problems proposed. Many of the questions, throughout the book, are asked simply for the purpose of suggesting lines of investigation which will lead to subsequent discovery and of calling up past experience which will assist in subsequent interpretation,

A.—Constant Change and Reconstruction of Mind and Body.—Endeavor for the space of one minute to keep your mind unchanged. For example, concentrate your attention upon the book in your hand and try to have the content of Consciousness at the end of a minute exactly the same as at the beginning.

Describe what took place.

Perform other experiments to prove that while we are awake the mind constantly changes.

(The study of such changes is called Psychology).

Give examples of comparatively slight and of rapid changes of the body.

Give examples of mental states where changes seem to occur very rapidly and of others where there seems to be but little mental change.

Describe differences in your feelings during periods of slight and of vigorous activity.

Why are food, air and water necessary to the body? It is estimated that the constituents of the body are completely changed every seven years.

Describe the processes by which such change is effected.

State some causes of mental change and show briefly how mental changes are brought about.

In the example of changes referred to on page 1, is it probable that at any stage during the twenty years, either mind or body remained unchanged for any appreciable period of time? Why would Education be impossible, if the child did not possess this capacity for change?

Give examples to show that some types of mind naturally change more rapidly than others.

B.—Extended Infancy.—Compare the capacities, tendencies, powers, possibilities of a little child with those of the lower animals, *e.g.*, a fish.

Which of the two matures the earlier?

Which is the more helpless at birth?

What effect should this dependent experience of the child have upon the development of his feeling of sympathy for others?

Compare the interests and desires of a child with those of other animals.

To what extent is a fish capable of education?

Compare the knowledge and powers of the most sagacious animal you have known with those of man.

What advantages are possessed by the child as a result of his power to acquire extensive knowledge and form numerous new co-ordinations on the basis of a few fundamental activities?

What superior advantages accrue to the child as a result of the long period of learning activity before reaching maturity?

C.—Environment.—Consider the influence of the child's surroundings upon his educational advance.

Point out ways in which his education is dependent upon animals, plants, inorganic substances, natural scenery, etc.

For about how many years is the child dependent upon society for food and clothing?

If a boy were to live to the age of fifteen years, under conditions such that he never came in contact with any other human being, what would he be likely to learn of his own accord?

Would he learn to walk erect?

In what ways would he gain a knowledge of plants, of animals, of self-preservation, etc.?

Would he have ideas of right and wrong?

How would his education differ if placed during this period:

(a) In a barbarian tribe?

(b) In a semi-civilized tribe?

(c) In a civilized community, without school or teacher?

(d) In a civilized community, with school and teacher?

How would his methods of gaining knowledge differ in each of these respective situations?

Why is it difficult to educate a child who is deaf and blind?

A child pays attention to only a few of the objects surrounding him. Upon what basis does he make his selection?

D.—Imitation.—Give examples from your observation to show that the child is an imitative being, having a natural tendency to copy those about him.

Give examples to show that he is a social being, desirous of mingling with his fellows.

To what extent do these imitative and social tendencies affect his education?

E.—Self-expression.—Is the usual condition of a little child, when awake, active or passive?

Consider how much he learns during the first year. Is it necessary to urge him to learn? Would it be impossible to keep him from learning?

Why does he move about so much? One exercise, *e.g.*, drawing a straight line, is assigned the child by the teacher. Another, *e.g.*, drawing some object in which he is interested, is undertaken as a result of his natural self-activity. Which of these exercises is the more pleasing to the child? Would it be possible to interest him in activities naturally uninteresting to him? Would it be wise to do so?

Compare the relative values of imitation and self-expression as factors in education.

In what sense is the statement true that "all education must be self-education?" In what sense is it false?

Compare the desires of an infant three days old with those of a child ten years of age. Is there any reason for, or advantage in, this change of interest?

II.—SOCIETY, SCHOOL AND TEACHER:

What would be the probable result if a highly-civilized community were to have no schools nor teachers of any kind for one hundred years?

Point out ways in which an educated person can be more helpful to society than an uneducated one.

Why is it in the best interests of both the individual and the state that everyone should receive a good education?

Can the child receive such education without the aid of society?

Why is the education of nature, of the tribe, or of the home, insufficient?

Why is the school necessary?

Why is the teacher necessary?

Why is it important that there be adequate schools and teachers?

Why is it the duty of society to provide these?

Consider the following:

It is probable that always in life, waking or sleeping, there is constant change of body and mind. This change is the result of a reconstructive process by which the former condition breaks down and a new condition is built up. At times (*e.g.*, during sleep) this reconstructive process is scarcely perceptible; at other times (*e.g.*, during the solution of a difficult problem or during violent physical exercise) there is rapid change of mental or physical make-up, accompanied by a feeling of effort on our part and a consciousness that we are overcoming obstacles and achieving the end we have in view.

Further, the possibilities of change are very great. The period of extended infancy, that is, of special adaptability to rapid change, is much longer in the case of a child than in the lower animals, and the capacity for acquiring knowledge

and forming habits is almost infinite. The child is essentially a self-active being. He possesses natural aptitudes, interests, impulses and desires which seek for satisfaction, and which, under natural conditions, impel him to constant activity. In this activity he finds his greatest happiness in overcoming obstacles which interfere with his highest development. He is not a passive recipient of knowledge and a blind imitator of the activities of others, but a discriminating and self-expressive personality, constantly on the alert, living in a selective and reconstructive attitude, with desires of his own, which he constantly strives to realize.

It is of vital importance to the child that he should receive the very best education possible, and that at every step of his development his energies should be directed upon the proper material, in the best way.

His development is greatly influenced by his surroundings. At birth he is the most helpless of animals. For years he is dependent upon society for the necessities of life, and his advance from barbarism will depend very largely upon the educational material furnished him by society, the opportunities afforded him of gaining a mastery of this material, and the social guidance which will stimulate him to the highest form of self-activity.

The human being is thus more dependent upon other members of its species than any other animal; and, without a high degree of sympathy, co-operation and self-sacrifice on the part of society, the child could neither live nor gain an education.

The Individual and Society.—The advantages of education are not confined to the individual who receives the education. It is also in the interests of *society* that the child be educated.

Society possesses a vast heritage of literature, art, science.

It is important that much of this material be translated into the consciousness of the child and by him increased, improved and handed forward to the next generation. To attain this end it is necessary that the slow method of nature, by which the learner laboriously discovers everything for himself, be displaced by a more rapid and rational method, by means of which, in a few years, the child will gain control of the results of centuries of development. It is desirable, also, that the child be socialized so as to become a helpful member of society.

In other words, the purpose of education is to gain such control of the development of individual experience that at every step of the process through life the changes effected will be the best possible for the individual himself and for society at large.

The school and teacher are the most satisfactory means for enabling the child to gain such education. Under these conditions society establishes the school in order that the child may receive the highest type of education in the best way.

The school is thus a social institution, an artificial instrument created by society for facilitating educational processes, and the teacher is the mediator between society and the child to endeavor to see that the most desirable changes are effected in the child's development.

CHAPTER II.

Educational Problems and Their Solution

I.—EDUCATIONAL AIMS:

Point out differences between an educated and an uneducated man.

Define education.

Reconsidering child development from the standpoint of the highest purpose of education, state generally under headings enumerated in the first question of the previous chapter, the qualities which, in your opinion, should be possessed by the ideal man when he arrives at maturity.

Would all agree with your estimate? Should the aim of education be different for different individuals and for different countries? Should a boy who is to spend his life on the farm receive the same education as one who is to be a lawyer?

Name different educational aims which have been selected as most desirable.

Why is it important that the highest type of educational aim be selected?

Discuss the merits and defects of the following as educational aims:

- (a) An examination certificate.
- (b) A prize.
- (c) Literary reputation.
- (d) Social reputation.
- (e) Wage-earning power.
- (f) Capacity for sensuous gratification.
- (g) A special power trained to maximum efficiency, regardless of harmonious development, *e.g.*, great

physical strength, military skill, or a retentive verbal memory.

(h) Knowledge.

(i) Power to—

1. Interpret a new situation.
2. Appreciate nature in all its forms.
3. Live a complete life.
4. Help others.

(j) The harmonious development of the individual.

(k) The development of a good citizen.

Consider the following:

The work of the educator is to utilize the materials at his disposal in such a way that the mental and spiritual changes in the developing child will all tend to the production of the highest type of socialized individual.

The Formation of Character is the Highest Aim of Education.—The child is not a receptacle to be filled with unassimilated knowledge, nor an individual who requires only to be taught a few tricks of manner incorrectly called culture, nor does he possess innate wisdom which can be developed out of his inner consciousness. He possesses capacities and powers which, through his own exertion and the assistance of society, may enable him to become a noble and vigorous personality, a blessing to himself and to others. Selecting what is best for him in the products of civilization possessed by society, he is to make it his own and improve upon it. He thus will gain control of himself and of the forces about him, and this mastery will be for purposes of service.

While preparing for the future, he is from the beginning to be brought gradually into an explicit realization of his own powers and responsibilities as a member of society, forming correct ideas and living the life best adapted to his own development.

Thus, when we speak of character as the aim of education, we mean a certain attitude which is true culture, which combines both knowledge and discipline, and which contributes to the special needs of the individual and of society.

These special needs can be discovered only by a study of actual conditions. The child who has spent the first six years of his life in a home of ignorance, squalor, disease and crime, requires a different treatment from the child who comes from ideal home conditions. One of the practical aims of education in the former case is to overcome certain habits which the latter child has had no opportunity to form. The future life of the child should also receive some consideration. The education which would best fit a child for citizenship in China, might not be in all respects the most satisfactory preparation for Canadian life.

II.—EDUCATIONAL MEANS:

Let us next inquire what are the best means which society can adopt, by which to attain the highest aim of education, dealing with the materials used and the methods of procedure.

A.—**Materials.**—Take as an example a boy ten years of age and consider how his educational advance would be affected by each of the following conditions:

The child is the victim of hereditary disease.

The teacher has only a superficial knowledge of the subjects which he attempts to teach and is lacking in the elements of true culture.

The school building is unsightly and unhygienic.

The educational standing and ideals of the community are at a low ebb, and little interest is taken in school matters.

The parents are too poor to provide suitable food and clothing for their children.

The subject matter of the books used is insipid and com-

monplace. There are no books of high literary merit, and no valuable pictures or museums within reach.

The school is devoid of illustrative material, and the surrounding country is flat and uninteresting.

Briefly outline, in a general way, the types of materials that, in your opinion, would make for the highest educational advance, dealing with each of the following:

- (a) The child, his health, disposition, habits, etc.
- (b) The teacher, his natural aptitude, equipment, aims and powers.
- (c) The school supervisor, parents and trustees, their intellectual, moral, social and financial condition, their educational ideals, sympathies, etc.
- (d) The facilities for coming in contact with the best products of literature, art and science.
- (e) The environment when outside of school—the hygienic condition of the home, natural scenery of the neighborhood, etc.

Which of these are beyond the direct control of the teacher?

In what ways can the teacher influence the home conditions of pupils?

B.—Methods.

1. *Selection and Arrangement of Subject Matter.*—Consider the educational effects of each of the following:

- (a) Children are taught the best methods of picking pockets.
- (b) They are taught to memorize the names of thousands of small, remote and unimportant islands.
- (c) The attention is confined exclusively to reading, writing and arithmetic.
- (d) Thirty different subjects are attempted at one time.

(e) A child ten years of age is taught drawing and music, but is not taught to read and write.

(f) Multiplication is taught before addition.

Would it be possible to teach a child all that has been discovered? Would it be an advantage if it were possible? Give examples of certain subjects that would be appropriate for a child of fifteen years that would not be suitable for a child of six.

Why is it that a logical sequence should be observed in teaching any subject, *e.g.*, Arithmetic?

Briefly indicate points which should receive attention in the selection and arrangement of courses of study.

2. *Methods of Teaching.*—Critique each of the following methods of teaching:

(a) The teacher tells everything and discourages pupils when they attempt to find out anything for themselves.

(b) The teacher acts upon the theory that the pupils should discover everything for themselves.

(c) The teacher devotes all his attention to bright pupils.

(d) The teacher devotes all his attention to dull pupils.

(e) The teacher treats all children exactly alike.

(f) The teacher spends as much time on easy as on difficult problems.

State briefly, principles that should be borne in mind in conducting a recitation.

C.—Conditions of Study.

State educational effects of each of the following:

(a) At a time when colds are prevalent and coughing has interfered with the work of the school, the

- teacher makes a rule that all coughing is to stop, and says he will punish the next pupil who coughs.
- (b) He seats near-sighted pupils at the back of the room.
 - (c) He raises window blinds in front of the room and leaves them down at the back of the room.
 - (d) He insists upon pupils turning out in a heavy shower of rain at the usual time for dismissal, when there is good reason to believe that the rain will cease in a few minutes.
 - (e) He does not know how to manipulate the heating apparatus and allows the temperature of the room to rise to 90 degrees F.
 - (f) The school is furnished with valuable apparatus, but he neglects to use it.
 - (g) He habitually uses incorrect language.
 - (h) He loses control of his temper in the class-room.

Is there a certain kind of material or subject matter, which for a certain child, at a certain definite time, is preferable to any other?

Is there a certain method of presentation which is preferable to any other?

Are there certain conditions of study which are preferable to all others?

In what ways would it have been an advantage to you in your education if you had always had the best subjects presented to you at the proper time by the best methods, and under the most perfect conditions?

To what extent is the teacher responsible for the selection of the best aims, methods and conditions?

Consider the following:

If the education of the child is to be the best possible, there must be a definite aim in view and definite means of attaining the end desired.

The materials and methods available are almost infinite in variety, and the problem of how to secure the best methods and materials is a highly complicated one. Over certain phases of educational procedure the teacher has but little control, in regard to others almost everything depends upon the teacher, and upon his fitness for his duties will rest, very largely, the success or failure of the system.

III.—THE PREPARATION OF THE TEACHER:

In the cases quoted on pp. 11, 12 and 13, in which the teacher is responsible, show to what extent the possession of common-sense, natural aptitude and high scholastic attainments by the teacher would aid in preventing the errors recorded. Are these natural qualities a sufficient equipment for the teacher without further preparation?

Let us next inquire what kinds of investigation will best prepare the educator who possesses these qualities (natural aptitude, etc.), to solve educational problems more wisely and quickly than he otherwise could.

Make a list of such subjects as, in your opinion, would be of assistance in such preparation.

Taking the examples already given (pp. 11, 12, 13), state briefly in what cases and in what ways a working knowledge of the nature and development of the mind would be of service to the teacher.

CHAPTER III

Psychology—Methods of Study—Contribution to Education

I.—EDUCATIONAL PSYCHOLOGY:

We have found that, during human life, and more particularly during the period preceding maturity, there is constant change and reconstruction of mind and body.

We have also found that the fundamental problem of educational science is how to secure the most desirable changes at every step in the process, and that the function of the school and teacher is to see that such changes are brought about in the best way, during the school period of life.

The science which deals with the human mind—its nature and processes, is called Psychology. The Psychology which is of most value to the educator is that which deals with the changes which accompany the interaction of mind with mind.

That phase of Psychology which investigates mental changes with the purpose of discovering facts which will aid the educator in his work, may be termed Educational Psychology.

II.—CAUSES OF MENTAL CHANGE:

Describe ways in which changes have been effected in your mind by:

- (a) Other minds.
- (b) Objects external to your body.
- (c) Your body.
- (d) Your mind.

Describe changes which you have observed in the minds of other persons and the causes which, in your opinion, produced these changes.

III.—METHODS OF PSYCHOLOGICAL STUDY:

In what ways can mind be studied?

In what ways have you already studied mind?

(a) *Introspection*.—Close your eyes. Try to recall the home of your childhood—the house and its contents. Note the order in which the various representations appear and try to account for this sequence.

The process by which we look into the mind and study its operations is called “introspection.” Introspection is usually understood to include Retrospection. Point out advantages and disadvantages of this method.

(b) *Physiological Psychology*.—Take three glasses of water, hot, lukewarm and cold. Place one finger in the hot water and a finger of the other hand in the cold water; after about ten seconds remove both fingers to the lukewarm water. Describe the mental change that takes place when both fingers are placed in the lukewarm water. Do you receive similar sensations from the two fingers? Perform other experiments to prove that the human body is not a reliable test of temperatures.

Such study of mental operations, by means of experiment, upon the organs of sense is called Physiological Psychology.

(c) *Child Study*.—Consider the case of your own development from infancy to maturity. Divide the period into three stages—Infancy, Childhood and Youth, and point out prominent characteristics of each stage—as to natural interests and activities.

Observe children of different ages and give examples to show that, speaking generally:

1st. The period of infancy—say the first six years of life

—is devoted to gaining control of the fundamental bodily organs and to play, in which the activity is its own reward, in that it furnished immediate free expression to the powers gained and without any thought of future recompense.

2nd. In childhood—from six to twelve or fourteen years—there is more deliberation and consideration. The idea of a result being reached as the product of a series of events is developed and the child's activities thus begin to assume orderly sequence. His plays have a beginning, a middle and an end. He is interested in stories of considerable length, and likes to observe a succession of changes in growth or construction, and to do the work with a definite, but not very remote end in view. The unity of interest during this period is found in serial order, in a relation of means and ends, in a history or scheme. The child finds his greatest satisfaction in the development of skill in the attainment of some life purpose, and he is pleased to find that he has gained a power to cause the activity to come out differently from the way in which it otherwise would.

3rd. In youth the mind takes on a more reflective or scientific attitude. Interest widens and deepens. The focus of interest shifts from family to society, from present to future, from events to their causes. Activity becomes more earnest and continued, and the ends selected more remote.

Such investigation of mental development as the foregoing is called Child Study.

Other methods of Psychological study are the investigations of:

- (d) The adult mind.
- (e) Abnormal minds.
- (f) The minds of lower animals.
- (g) The forms of expression of peoples at different periods, architecture, language, music, etc.
- (h) Psychological text-books.

IV.—OBSERVATION AND EXPERIMENT:

Experiment and Text-book.—

Why is it better in Natural Science to begin with experiment and observation, rather than with a text-book?

What advantages accrue from the subsequent use of a text-book?

Illustrate by your treatment of the subject of Chemistry.

Why is it advisable to adopt a similar method in Psychological study?

The Scientific Method.—

State the distinguishing characteristics of scientific experiment as compared with casual observation. Discuss the statement: A scientific experiment is a question put to Nature. Describe in detail some Natural Science experiment which you have performed, *e.g.*, the analysis of water by electrolysis. In a Natural Science experiment, do we observe the process of Nature just as it is, or do we set up artificial conditions and control them with a view to obtaining an answer to some question which we have in mind?

What points should be observed when conducting scientific experiments? Why is it necessary in performing scientific experiments:

- (a) To keep the mind unprejudiced?
- (b) To rid the experiment of all unnecessary accessories?
- (c) To perform the experiment carefully?
- (d) To repeat experiments?
- (e) To observe and describe only that which takes place and which is of value in our investigations?
- (f) To see that our conclusions are logical?

Give definite examples of the foregoing.

Difficulties of Psychological Observation and Experiment and Methods of Overcoming Them.—

A.—*A Study of Others.*—To what extent can you judge of a person's sensations, feelings, thoughts, desires by observing him carefully? Why is it difficult to make correct judgments in such a case? Is there more or less likelihood of error in the case of the observation of a little child than of an adult? Call to mind cases when, as a child, you were misunderstood by those who observed you. Give suggestions which will aid in making correct interpretations of the appearance and actions of adults and of children.

B.—*Study of Self.*—Have you ever heard a person say he was not angry when he was angry? Is it possible for one to deceive oneself in such a case? How can you test whether you are angry or not?

Have you sometimes, when asleep, wondered whether you were dreaming or awake? Under such a condition, why do you waken, if you test by pressing some hard object vigorously with the hand?

Give similar examples of misinterpretations of experience and suggest methods of correction.

C.—*Unity of Experience.*—Point out ways in which the changes in your present experience are due to (a) past experience, (b) your desires regarding the future.

Show that in the study of any definite period of the life process, attention must be paid to (a) the situation out of which the experience emerged and (b) the situation to which the experience is naturally tending.

D.—*Control of Mental Change through External Stimulus.*—Point out ways in which the changes in your present experience are due to the influence of your present surroundings. To what extent can you control future changes

by establishing conditions which will stimulate the nerves in certain ways?

Perform a number of experiments by which you will receive certain sensations at a definite time.

Suggest ways in which such experiments may fail and show how failure may be avoided.

E.—*Internal Control of Mental Change*.—Point out ways in which changes in your present experience are due to self-activity. To what extent can you thus control your experience?

Perform a number of experiments in which, at a certain time in the future, you will remember or imagine or think in a certain definite way, *e.g.*, establish such conditions that in five minutes from now you will be mentally reviewing the fourth proposition in Euclid's first book of Geometry.

What difficulties are met with in the attempt to control changes in the life process by means of effort on our part? Why can we sometimes do more effective thinking when our eyes are closed than when they are open? Outline methods of overcoming difficulties which arise when we endeavor to control the mental current by our own effort.

F.—*Artificiality of Introspection*.—We found that in our study of mind we investigate processes and not permanent, unchanging entities. To what extent is the statement true that we never study what is at present in consciousness but rather a memory of past experience?

How does the content of consciousness, when we are examining it, differ from the natural condition? Can we ever study the content of our consciousness without being conscious of the fact that we are studying it?

In what ways can the objection "that Introspection is artificial," be reduced to a minimum? Why is it an advantage to supplement introspection by immediate objective observation of other individuals?

In the investigation of Mental Change, we may begin with the study of children and note the genesis of habits through successive stages from earliest infancy to adult life, or we may begin with a study of our own minds, making a cross-section (so to speak) of the content of consciousness at a particular moment, another cross-section a few moments later, and so on, and by comparison, note changes which have taken place and the causes of these changes.

We shall begin with the latter method, as lying closer to hand, and leave Child Study to subsequent investigation.

V.—EDUCATIONAL PRINCIPLES BASED UPON PSYCHOLOGICAL OBSERVATION AND EXPERIMENT:

Experiments:

1. (a) Have someone hold an object, *e.g.*, a picture, before your eyes for one second and then withdraw it. Endeavor during this brief presentation to gain as full a knowledge as possible concerning the object.

(b) Have the experiment repeated as in “a,” with the exception that the picture is kept in view for one minute instead of one second.

State educational principles which are suggested by these experiments and which could be verified by further experimentation.

To what extent do you find the following principles substantiated by the foregoing experiments?

One cannot look attentively at an object for a time without gaining some knowledge of the object.

Other things being equal, the more continued the observation the greater is the knowledge gained.

The growth of knowledge is from vague to definite.

Former knowledge is used in acquiring new knowledge.

2. Compare a drawing made by a child of four years with another made by a youth of sixteen years, and deduce educational principles from your comparison.

To what extent does this comparison verify the educational principles stated in the former experiment?

3. (a) Have someone ring a bell or make some other noise near your ear. Press the desk with your fingers as quickly as you can after hearing the sound.

(b) Have someone ring a bell as before. Press your foot on the floor as quickly as you can after hearing the sound.

(c) Have someone flash a colored disk before your eyes. Press with your fingers on the desk as quickly as you can after seeing the object.

(d) Have someone present an object as before and press with the foot on the floor as quickly as you can after seeing the object.

Repeat the foregoing experiments, keeping a record of the time occupied in each experiment and endeavor by practice to shorten the time in each case.

Could you ever learn to respond so quickly that no time whatever would elapse between the time when the stimulus impinged upon the end organ of the sensory nerve (the retina of the eye or the tympanum of the ear) and the time when it was responded to by muscular movement? Such intervening period is called reaction time. In experiment 3 (a) this period is said to be your ear-hand reaction time. In (b) your ear-foot reaction time, etc.

(e) Repeat experiments (a), (b), (c) and (d), directing the attention mainly upon:

1st.—The reception of the stimulus, *e.g.*, in (a) attend more carefully to the hearing of the sound than to the pressing on the table.

2nd.—The muscular response.

3rd.—The easier activity, *e.g.*, if you find more difficulty

in pressing the desk quickly than in hearing the sound quickly, pay special attention to the sound.

4th.—The more difficult activity.

In psychological laboratories, reaction time is measured with scientific accuracy by some such method as the following:

The operator and the subject whose reaction time is to be measured are in adjacent rooms, which are connected by telephone and telegraph. The subject holds the telephone to his ear and places his finger on the telegraph button. The operator sends a sound stimulus over the telephone. The subject presses the telegraph button as quickly as he can after hearing the sound. The operator records the time (which is accurately indicated on a clock) which has elapsed between the sending of the telephone message and the reception of the telegraphic response.

He performs a number of similar experiments and averages the results. The average is his ear-hand reaction time.

For a detailed description of such experimentation, see "Reaction Time, a study of attention, *Psychological Review*, 1896, Vol. 3, p. 245."

(f) Have a number of persons stand in a ring and join hands. Have an assistant hold a watch where the experimenter (who is number one of the group) can see the watch and keep a record of the time. Explain that the purpose is to find how rapidly a signal can be passed around the circle. Number one (the operator) presses with his right hand the left hand of the person to his right, who in turn immediately passes the signal on by pressing with his right hand the left hand of number three, and so on. The operator keeps a record of the number of seconds which elapse between the time when he gives the signal to his right-hand neighbor, and the time when he receives it back from his left-hand neighbor after it has passed around the circle.

The following is a statement of the results of a series of such experiments, conducted by students in the Ottawa Normal School:

First day: There were seventy-one students together with the experimenter:

First experiment—time, 26 seconds.

Second “ “ 24 “

Third “ “ 21 “

Fourth “ “ 18 “

Fifth “ “ 24 “

Sixth “ “ 19 “

Seventh “ “ 18.5 “

Between the fourth and fifth experiments the students rested for a few minutes, and directed attention to another subject.

Second day: There were seventy-two students together with the experimenter. The average time for six experiments was eighteen seconds, *i.e.*, one-fourth of a second for each student.

(*g*) Let everyone concentrate attention upon the left hand, *i.e.*, upon the reception of the stimulus. Perform a number of similar experiments and note the results.

(*h*) Let everyone concentrate attention upon the right hand, *i.e.*, upon passing the stimulus on to his next neighbor. Repeat experiments. Average results.

(*i*) Let everyone concentrate attention upon the activity which he considers to be the more easy. Perform a number of experiments and average the results.

(*j*) Let everyone concentrate attention upon the activity which he considers to be the more difficult.

Perform a number of experiments and average the results.

The following are the results of a series of similar experiments made by directing attention upon easy and difficult activities respectively:

- (1) Attention upon less difficult:
Number of students, 63.
Number of experiments, 4.
Average time, 18.25 seconds.
- (2) Attention upon more difficult:
Number of students, 63.
Number of experiments, 4.
Average time, 13.5 seconds.

State educational principles which are suggested by the results of experiments (a) to (j) inclusive.

To what extent do you find the following statements verified by the experiments which you have performed?

Intense external stimulus attracts the attention.

We cannot give maximum attention at the *beginning* of a lesson.

With practice, a point of maximum efficiency is reached, beyond which it is difficult to increase speed.

Novelty increases interest.

Change of activity increases the power of attention.

If we attend to the more difficult activity, reaction time is lessened.

A brief period of rest recuperates attentive power.

When the habit is formed the activity can be performed without effort.

Repetition is necessary for the formation of habits.

Concentration increases power of acquisition.

In the case of an established habit it is possible to perform the activity so mechanically that reaction time is lengthened.

Emphasis of the end in view increases attentive power.

Desire to perform work rapidly causes concentration of attention and this increases speed.

Fatigue increases reaction time.

A reminder that one is not doing one's best work is sometimes a stimulus to attention.

An interesting external stimulus diverts the attention from the subject to which one should attend and lengthens reaction time.

Conscious effort increases working power.

Excited effort may either increase or decrease working power.

Co-operation is necessary in the performance of social activities.

Give examples of activities which you have performed until they have become automatic, which if attended to closely are not performed as well as when you pay no attention to them.

A large number of experiments have proved conclusively that the educational principle that "attention should be centered upon the greatest obstacle," is applicable not only to reaction time, but to the overcoming of every kind of difficulty.

VI.—SCHOOL-ROOM APPLICATIONS:

A school-room application of the foregoing educational principle would be that in teaching a child to spell the word "belief" (after he has had training in phonic synthesis) stress should be placed upon the combination, *ie.*, and no attention devoted to remembering the first three letters and the last letter of the word, for the pupil who knows the pronunciation of the word will spell it properly as regards these four letters, without assistance from anyone.

Show how the principle that attention should be directed upon that phase which presents the greatest difficulty, and easy habitual activities should be allowed to take care of themselves, may be applied in giving calisthenic exercises in school.

Give school-room applications of educational principles, on p. 21.

State a number of psychological facts which you have discovered as a result of psychological investigation.

Write educational principles based upon each of these facts and show how these principles may be applied in the school-room.

In determining which of two studies (*e.g.*, Algebra or Botany) a certain child should study at a certain time (it being possible to take only one of them), what facts should be known regarding (*a*) the relation which these studies respectively bear to mental development; (*b*) the stage of mental development reached by the particular child who is to begin the study?

How would Psychological study aid in discovering these facts?

Give examples of ways in which Psychological study would aid the teacher in discovering what branch of study was best fitted to a particular child at a particular time.

In what way would Psychological study aid in determining at what time a child should begin a certain study, *e.g.*, Geometry?

In what way would Psychological study aid the teacher in determining the best *method* of teaching a particular subject (*e.g.*, multiplication of fractions) to a particular child?

References:

Adams—Herbartian Psychology applied to Education.

Angell—Psychology.

Bagley—The Educative Process.

Dewey—The School and Society.

James—Talks to Teachers on Psychology.

Judd—Genetic Psychology for Teachers.

Kirkpatrick—Fundamentals of Child Study.

Lloyd Morgan—Psychology for Teachers.

Thorndike—Principals of Teaching.

Titchener—A text-book on Psychology.

CHAPTER IV

Analysis of the Individual Life Process

We have found that education has to do with the control of changes in the individual life process. Let us next proceed to an analysis of the process and to an investigation of ways in which these changes are brought about.

I.—NON-CONSCIOUS ACTIVITIES:

Give examples of mental or bodily changes which have taken place in your own life history and of which, at the time, you had no immediate knowledge.

A.—Natural Non-conscious Activities.—

1. Instinctive.—Describe the action of a person when he suddenly and unexpectedly hears a loud noise behind his back. Is his action due to reason? Is it due to heredity? Can he train himself not to be so startled? Give examples of other instinctive activities.

2. Reflex.—If the sole of the foot of a person who is asleep is tickled, the foot is drawn up without any conscious knowledge or effort on the part of the sleeper. Give similar examples of muscular activities which are performed in direct response to stimulation of the end organ of the nerve without any conscious direction on the part of the individual. Such acts are called "reflex."

3. Automatic.—The circulation of the blood is said to be due in part to stimulation of the muscles as a result of the chemical composition of the blood. Give examples of other changes which go on within your body and concerning which

you have no conscious knowledge. Such activities are said to be "automatic."

B.—Acquired Non-conscious Activities.—

(a) Reflex.—Can you walk without paying any attention to the walking? Could you always do so? Could you do so if the soles of your feet were paralyzed? Give examples of other acquired reflexes, as the result of repetition. Why may they be called habits?

(b) Automatic.—When you are asked to add 16 and 9, do you think of 16 objects and 9 objects? Were you always able to state the sum without hesitation as you now do? Why may the activity be said to have become automatic?

Give examples of other acquired automatic activities. Why may they be called habits?

II.—PARTIAL OR ABNORMAL CONSCIOUSNESS:

A.—Sub-conscious Activity.—A physician, who is superintendent of a hospital, has one bell as his call signal. The assistants have signals of two, three and four bells, respectively. The superintendent sleeps soundly, and is entirely oblivious to the calls of two, three or four bells; but if the one bell signal rings at any time of the night, he immediately wakes up.

Can you form a habit of shutting out or exhibiting certain sounds when asleep, and of attending to others?

Can you waken earlier than your usual time by making up your mind to do so? When you thus decide to waken at a certain time, do you sleep as well as you do when you attach no importance to the time of waking? Do you sometimes find in the morning that a problem which was unsolved when you retired the previous night now presents an easy solution? Give other examples of so-called sub-conscious activity.

B.—Absent-mindedness.—A distinguished mathematician was observed walking along the street in a pouring rain, at the same time using his umbrella as a walking-stick. Give other examples of extreme concentration and accompanying absent-mindedness.

C.—Abnormal Consciousness.—The recorded experiences of those who have been deaf, blind, and dumb from their birth, and who have subsequently learned to converse, shows that they have no true conception of sound or color, and that before learning language the content of consciousness was at all times vague and fragmentary.

D.—Infant Consciousness.—The study of children reveals the fact that at birth the content of consciousness (if the child may be said to be conscious at all) is confused and indistinct. As time goes on the undifferentiated, vague, “sensuous continuum” begins to assume definite conscious form. It is some time before the senses perform their functions sufficiently well to render sensations explicit in consciousness, and throughout all the years of infancy, childhood and youth we may say that education is nothing more nor less than a growth toward fuller consciousness.

III.—ENTIRE CONSCIOUSNESS:

What do you mean by the term Conscious when, in performing the reaction time experiment, described on p. 23, you say you were conscious? Repeat the experiment and make an analysis of the mental changes which you experienced. Did you know during this experience that you were yourself—and not someone else, and that no one else was having the same experience, that you were the same person that you were the previous day, that the signal stimulus came from outside your body, that you were putting forth an

effort to convey the signal to the next person as quickly as possible, and that you really did pass the signal on?

Speaking generally, full or complete consciousness may be said to be the possession of any individual when he can synthesize the elements of this present experience, connect the present with the past and respond properly to stimulus received, when he knows who he is, what he is doing, what he has done in the past, what stimulus he is now receiving, what reactions should be made, and when he is capable of making such adequate response as the needs of the situation demand.

The term "Consciousness" cannot be defined. Its meaning can be explained somewhat by such characteristics as those to which we have just referred. We can, however, study various forms of consciousness and the conditions under which they arise, and (as we have seen) this is the phase of the subject which is of special interest to the educator.

IV.—THE GROWTH OF CONSCIOUSNESS:

Observe an infant for the first few years of his life, or study the recorded observations of others and state what you have learned regarding the growth of consciousness. Similarly study the life of someone whose consciousness has been abnormal, *e.g.*, Helen Keller, and notice its development. Call to mind, also, the ways in which people who have lost consciousness slowly resume the conscious condition.

When you are reading and walking, without paying attention to the walking, and come in contact with an obstacle, (*e.g.*, a chair), what change takes place in your consciousness? Why do you notice the beating of your heart when it beats more rapidly than usual? Give other examples where an habitual, automatic or reflex activity becomes a conscious activity when anything occurs to interfere with the ordinary process and to require reconstruction. Does consciousness

ever arise except under conditions where it is necessary for us to deal with some new difficulty? Give examples. Consider the following: "We find consciousness appearing at those points where there is incapacity on the part of the purely physiological mechanism to cope with the demands of the surroundings.

V.—ANALYSIS OF A CONSCIOUS ACT:

Observe the content of your consciousness and state as fully as you can the factors or elements found there and the sources to which they are referred.

Perform experiments to show that the content of consciousness may be affected by (a) stimulus from outside the body, (b) bodily stimulus, (c) our past experience, (d) the ideals we have formed, (e) our own effort.

Compare the content of consciousness during the reaction time, experiment p. 23, and during the time when you are solving a difficult mathematical problem and note similarities. Do you find that all the before-mentioned elements—external stimulus, bodily stimulus, etc., are present in both cases? Point out elements upon which special stress is placed in each case.

Show that in every act of consciousness there is always an apprehended content and an apprehension of this content.

VI.—THE THREEFOLD ASPECT OF CONSCIOUSNESS:

Intellect, Sensibility and Will.—One person is said to be very intellectual, another very emotional, and another very strong-willed. Point out characteristics which you would expect to find prominent in each. Which of the three would you expect to possess (a) the most knowledge, (b) the most sensitiveness to pleasure and pain, (c) the highest self-activity?

Give an example where the gaining of knowledge is the

most prominent feature of the activity, another where the feeling of pleasure seems to take possession of us, and a third, where we seem to be completely absorbed in the making of an important choice.

Which of the three aspects, knowing, feeling and self-activity is most prominent in each of the following experiences:

- (a) Gazing upon a beautiful picture?
- (b) Learning the names of the rivers of a country?
- (c) Learning to ride a bicycle?

Could you find a person who was entirely ignorant, or one who had no appreciation of pleasure or pain, or one who never willed to do anything?

Concentrate your attention upon some object in the room, *e.g.*, a picture, and note the phenomena of your consciousness. What new knowledge have you gained as the result of studying the object? Were the feelings which accompanied the experience, pleasurable or painful? Were you conscious that you yourself were performing this act, enjoying this pleasure, gaining this knowledge? Could you have an experience in which you were suffering so intensely that you were neither gaining knowledge of any kind nor performing any act? Similarly could you gain knowledge without sensibility or will, or be self-active without knowledge or sensibility? Show by examples that in every conscious experience all of these aspects, knowing, feeling, and self-activity, are presented in greater or lesser degree. Why may the last mentioned (*i.e.*, the personality—the self in action) be considered the basal and most important of the three?

VII.—FORMS OF CONSCIOUSNESS — PASSIVE — ACTIVE:

Attention.—What do you mean when you say you are paying attention to something? Give examples.

Investigate different ways in which you can pay attention:

Experiment 1.—Seat yourself in a comfortable, easy position. Allow your mind to assume the condition which immediately precedes falling asleep. Do not try to think of anything or to direct the mental flow. Let the condition be one of complete mental relaxation. Describe what takes place in consciousness. Would you say you were paying attention in this experiment?

Have you, in reading a book, sometimes caught yourself reading along without knowing what you were reading, and then have you gone back several pages to a certain point from which you have begun to read again? In such a case, were you attending to the matter read? Could you have had such an experience if you had been reading aloud? Could you have neglected the meaning in this way if your mind had not been fixed on something else of interest to you? Do you sometimes find yourself in a condition in which you are really not attending to anything and yet are conscious that you ought to be attending to something? Were you conscious in experiment 1? Give other examples of acts of which you were conscious, which you would not (strictly speaking) call acts of attention. Are such acts fatiguing or restful to the mind? How do they differ from acts of attention? How do they differ from the condition of sleep? How do they differ from the condition of non-consciousness? Why may such a condition be called *Passive Consciousness*?

Experiment 2.—Begin reading a very uninteresting book and at the same time have someone in the room play a musical selection which you admire very much. Describe what takes place. Do you pay attention? To what do you pay attention? Why do you pay attention to the music? How does this experience differ from that in experiment 1? Show that in experiment 2 there is more mental tension or stress than in experiment 1.

The teacher says that a boy is inattentive because he is so attracted by the music of the circus band in the passing procession that he is entirely oblivious to the history which he is supposed to be studying. To what is the boy inattentive? Could the boy keep from paying attention to the music? How could the boy's attention be kept upon the history?

Experiment 3.—Concentrate your mental energies upon some subject which, in itself, is not specially interesting to you and keep the mind fixed upon it for some time and note the phenomena of consciousness. For example, consider the truth of the following statement:

"The expression $x^2 + 41x + 41$ is always equal to a prime number except when x is equal to 4." Test it by inductively substituting for x the quantities 1, 2, 3, 5, etc., in succession. Do you always get a prime number? Is it probable that the statement is correct? Examine the expression more closely. What value for x would make it possible for you to break the expression into two factors? If we substitute 41 for x , do we get a prime number?

In proving the foregoing statement incorrect, were you performing an act of attention? How does this act of attention differ from that of listening to the musical selection in experiment 2? Show that in experiment 3 there is still greater tension and conscious control of the process with a view to attaining a definite end.

If there were something else at hand, naturally more pleasurable to you than the mathematical proof, would it be possible for you to concentrate your attention on the latter? How could you do so?

Experiment 4.—If, while proving the statement incorrect in experiment 3, someone had started beating a drum vigorously in the room, could you have continued to attend to the mathematical problem?

Difference of Intensity in the Conscious Field.—

When paying attention, do you always pay attention to something? Show by illustrations that when you are paying attention, certain parts of the content of consciousness seem to be brought into the foreground, and others to be partially or entirely obscured. If the conscious field be represented by three concentric circles, show that attention seems to be focussed on the centre, directed mildly upon the intermediate circular band, and almost entirely withdrawn from the outer fringe.

Try to think of a case where the mind has no choice as to the object of attention, that is, where there is but one thing that can be attended to.

Show by illustrations that there are always a number of different ideas or trains of ideas, any one of which might be the object of attention, *i.e.*, that attention is always a selective act—a concentrating and limiting process.

Stress of Attention.—In the reaction time experiment, p. 23, how did the condition of the body (muscles, breathing, etc.), when you were waiting for and passing on the stimulus, differ from the condition when you were resting?

When paying attention, are you always conscious of the fact that you are attending? What feeling always accompanies attention? For how long a period can you study a certain subject (*e.g.*, Arithmetic) without taking a rest?

Why does it fatigue you to pay attention? Give examples to show that when we pay attention there is always a certain effort, an expenditure of energy. Is attention to a subject that is very interesting (that seems to take possession of us) followed by fatigue? What is the derivation of the word Attention? Why is it correct to say that attention is active consciousness? Write a definition of Attention.

Consider the following:

"Attention is that activity of the self which connects all elements presented to it into one whole, with reference to their ideal significance, that is, with reference to the relation which they bear to some intellectual end."—*Dewey*.

"An act of attention is a powerful volition suffused with peculiar feelings of effort or strain and accompanied by a changed condition of the field of discriminative consciousness as respects intensity, content, and clearness."—*Ladd*.

"Attention is the taking possession of by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought; focalization and concentration of consciousness are of its essence."—*James*.

VIII.—KINDS OF ATTENTION:

A.—**Non-voluntary.**—If the temperature in your room were suddenly to fall thirty degrees, could you continue studying Psychology? Why not? Give a number of other examples of conditions which, if they should arise, would render it difficult or impossible for you to study, though you wish to do so.

Make a list of subjects to which you find it very easy to direct your attention. Are such objects always pleasing to you? If you burn your finger, do you attend to the pain spontaneously? Are such objects always external? Give examples of thoughts which you have found difficult to banish. Why do such objects attract the attention?

If you find your attention attracted to the playing of a beautiful selection of music when you desire to study, are you conscious of the fact that you are paying attention to the music spontaneously? Why may such attention be called Non-voluntary? Would the musical selection cause everyone to pay attention as you do? Why not? Why may such attention be called Reflex?

Give other examples of non-voluntary attention. Show that non-voluntary attention is based upon Interest.

B.—Voluntary Attention.—Do you always pay attention to that which for the time being is most interesting to you? Give examples of cases in which you do not pay attention to the most interesting thing, but to that which from the standpoint of present satisfaction is distasteful. Show that in such cases you always have an ulterior end in view.

Can you always make up your mind to endeavor to attend to a certain definite thing to the exclusion of other things which for the present are more attractive? Are you conscious of an effort on your part to pay attention? The previous form of attention, which was due to the attractiveness of the object, was called non-voluntary. What name might be given to the kind of attention which involves conscious effort of your will power?

Give other examples of voluntary attention.

C.—Involuntary Attention.—If, when you are studying, a door slams loudly, or there is a deafening peal of thunder, why do you cease studying? Could you keep from paying attention to the noise? Attention which seems to be given against the will is said to be involuntary.

Give other examples.

Which is more difficult, non-voluntary or voluntary attention?

What kind of attention is most prominent in early life?

Why should non-voluntary attention be developed into voluntary?

Name some activity which at one time in your experience demanded voluntary attention, but which now requires only non-voluntary attention?

If a subject, *e.g.*, a musical selection, be sufficiently interesting to attract your attention without conscious effort, can

you, by concentrating your attention on the subject, increase the attentive activity and the pleasure derived?

Consider the statement: "Voluntary attention is more difficult than non-voluntary, and this is the essential difference between these two forms of attention."

CHAPTER V

Reconstruction of Experience

Consider ways in which changes in consciousness are brought about.

I.—A UNITY OF PERSONAL EXPERIENCE TO BE REALIZED:

If an infant is plunged under water so as to be entirely submerged, what physical effort does it put forth? Why does it struggle? Does it consciously realize that if breathing be suspended for a long period, death must ensue? Does it have any definite idea of overcoming the difficulty by struggling? Are its muscular activities definitely co-ordinated? Compare the behavior of the little child under such conditions with that of the expert swimmer when his boat is upset. Describe what you consider is likely to be the conscious experience of each. Point out Physiological and Psychological resemblances in their behavior.

Would it be possible to find anyone who does not have some purpose in view which he wishes to attain?

Consider the following:

In early childhood, conscious experience (if there be such a thing) is of the vaguest sort, there are no clearly defined aims or controlled instruments for their realization, but there are instinctive and impulsive tendencies reaching out for that form of stimulus best adapted to the needs of the individual. At every period of conscious life there is a forward movement of the entire personality, alert for such experience as will make for its well-being. There is also the consciousness

that the present experience is merging into a new experience, and there is an accompanying feeling of tension between the old and the new.

II.—A NEW PRESENTATION TO BE ATTENDED TO:

What are the sources of the various elements which are presented in consciousness from time to time as objects of attention?

For example, how do the following arise in consciousness: *a.* The sensation of the ringing of a bell? *b.* The pain occasioned by toothache? *c.* The memory of a stanza of poetry? *d.* The image of a centaur? *e.* The train of thought in a mathematical investigation? *f.* The psychical accompaniments of the resistance of a powerful temptation?

Show that presentations in consciousness may be attributed to (*a*) External stimulus, (*b*) Bodily stimulus, (*c*) Internal ideas, images, etc., furnished by past experience and present activity.

Could there be consciousness if there were no presentation or content to be apprehended? Would there ever be attention if there were no new adjustments or reconstructions to be made? Compare the content of two successive pulse beats of consciousness and note similarities and differences.

Are these changes due to some principle of reconstruction and selection? Would they have been made if the first condition had been permanently satisfactory?

III.—ADJUSTING ACTIVITY OF ATTENTION:

Point out ways in which you get ready to perform any activity. For example, describe bodily or mental adjustments which you make preparatory to (*a*) going to sleep, (*b*) listening to music, (*c*) writing on an examination in Arithmetic.

Compare the adjusting activity of an infant turning to the light with that of a scientist looking through a telescope.

Describe the ways in which the mind acts in preparing for each of the following:

(a) To run a foot race.

(b) To find the area of a rectangle 6 ft. long and 3 ft. wide.

(c) To prove that the angles at the base of an isosceles triangle are equal.

How will attention be affected if in (a) the runner must win the race or lose his reputation?

Show that in all cases of highest activity of attention the end in view must seem to take possession of the mind to the exclusion of other things. Can this be the case if the person attending does not clearly understand what the aim is, *e.g.*, if in (a) he does not know how far he has to run, if in (b) he is not sure whether he begins with a vague limited quantity to be measured, or with a unit of measurement; or, if in (c), he is not sure what an isosceles triangle is? Show that in such a case it is necessary to clearly understand what end is to be attained.

If a runner in a race knew exactly when the pistol for the starting signal was to be fired, what advantages would he have over one who expected it to be fired a few minutes later? In what ways would he prepare himself to start running the race? In what ways could one prepare himself for the acts in (b) and (c)? Show how, if you adopt Euclid's method of proof, a review of Euclid's 4th proposition prepares for the activity in (c). Show that in preparing to attend to anything, (a) the mind should be actively directed to the attainment of the end in watchful anticipation and (b) anything which will aid in the attainment of the end should be brought into the foreground of consciousness.

This process of getting ready to attend to something is

sometimes called the adjusting activity of attention. Show by examples that adjusting activity is conditioned upon our appreciation of the importance of the aim in view, our power of attending as the result of habit, and our previous store of knowledge regarding the subject in hand. Show that there is a mental tension between the present experience and the future experience, an anticipation of what is about to happen.

IV.—THE APPERCEIVING, INTERPRETING, VALUING, RELATING AND ASSIMILATING ACTIVITY OF MIND:

A.—**Interpretation.**—What is meant by the term Interpret? Give examples. If you have never seen an orange and are now shown one for the first time, why do you conclude that the other side of the orange which you have not seen is spherical and of an orange color?

Can you sometimes tell that a person whom you meet for the first time is related to someone else that you know? Are the two persons exactly alike? How then can you tell that they are related?

B.—**Misinterpretations.**—Account for the following: A child brought to school a piece of Golden Rod, that had been standing since the summer before. The teacher held it up before the class and asked what it was. One of the pupils said: "It is some wool on a branch."

A little child of three years had seen the moon several times and had been told its name. She had never noticed the stars. The first time she noticed them she said: "Look at the baby moons."

C.—**Different Interpretations.**—Account for the following:

A number of persons observed an electric carriage which was being exhibited.

A little child was afraid of it. A boy of twelve remarked that it would be "great fun to ride in it."

A lazy man said: "No more walking after this."

A dealer in horses said: "I shall soon be a ruined man."

A scientist said: "What an ingenious contrivance, how is it constructed?"

Give other examples of ways in which our past experiences affect our interpretation of presentations. Can we gain any new knowledge without using old knowledge? Do we ever have a new experience without interpreting it in the light of past experience?

Give examples to show that after we once begin to know we always use past knowledge in gaining a knowledge of objects presented for the first time.

In learning to ride a bicycle, what previous knowledge is of value? Why is the power to judge distances of objects valuable?

State what previous knowledge or experience would be of value in performing each of the activities mentioned on p. 42.

Show that what is required in gaining new knowledge is to interpret and relate the new presentation in the light of past knowledge.

Why is it usually wise in introducing a new subject to review previous related knowledge?

Two persons gaze upon a beautiful statue. The train of ideas suggested by the statue is noble in the case of one and base in the case of another. Why may it be said that the statue is really bringing each person to Judgment?

Give examples to show that our interpretation of every new presentation depends upon our previous knowledge, occupation, character, etc.

The name *apperception* is sometimes given to the activity of mind by which, in acquiring knowledge, we use former knowledge?

Give other examples of apperception.

Examine the following:

"Apperception is bringing to bear what has been retained of past experience in such a way as to interpret and give meaning to new experience."

"Apperception is the highest and most comprehensive form of active consciousness. By it is meant that activity of synthesis by which mental data of any kind (sensations, percepts, concepts) are constructed and the perception of things which are related becomes the perception of the relation of things."

V.—ANALYTIC SYNTHETIC ACTIVITY OF ATTENTION:

Examine some object, *e.g.*, a rose, and note the ways in which the elements of sense-perception are differentiated, some being discarded, others selected and combined.

Do you experience any difficulty in distinguishing the perfume from the color, or the rose from other objects within your field of vision? Similarly, do you without effort combine the qualities of color, perfume, etc., as all belonging to the rose?

Give illustrations to show that with little children there is a tendency to pull things apart and put them together, and (with increasing age and insight) to reconstruct elements into new forms according to some principle.

Show that in all consciousness there is constantly a somewhat similar analysis, selection and synthesis of elements.

It is important to remember that analysis and synthesis are simply two phases of the same operation. For purposes of clearness, however, we shall consider them separately at first.

A.—Analysis, Dissociation, Discrimination.—Close your eyes, open them, and describe the change in your mental state due to seeing objects within your field of vision. When you first open your eyes, do you see objects one after another: First a tree, then a house, etc., and after a time the entire landscape within your cone of vision, that is (roughly speaking) within an angle of sixty degrees near and far, high and low; or do you, in the first instant, see the entire group as a vague, indistinct whole, and afterwards the parts? When you enter a picture gallery, are you at a loss, for a moment, to know what picture to examine? Why is this?

Give examples to show that we begin with a vague, indistinct, indefinite, complex whole.

After the first vague conception, what change takes place in consciousness? Could you continue to look at the landscape and give equal prominence to every part? Could you continue to look at the wall and give the same amount of attention to each square foot of its surface or to each picture? What do you find yourself doing as you continue looking? Examine some particular object, *e.g.*, a chair, and endeavor to continue thinking of it as it at first appeared. What takes place?

Show by examples that the mind has a tendency to differentiate the vague whole and analyze into parts making the parts and the parts of the parts more clearly defined.

How does the increase of concentration affect the rapidity and vividness of such analysis?

If a trained artist enters a gallery containing a valuable painting, *e.g.*, the Mona Liza, and a number of ordinary paintings, what change will quickly take place in his consciousness?

Will it seem to him that he is looking only at the one painting, *i.e.*, will he, for a moment, forget that the other objects are within his cone of vision?

B.—**Synthesis, Association.**—We have found that the content of consciousness is constantly changing.

Give examples in which one mental picture is suggested by a preceding mental state, where "one idea calls another up." Write down whatever first occurs to you after reading each of the following: "Noble six hundred," "black," "turkey," "school," "large."

Compare these ideas with those that suggested them and note the relation, *e.g.*, if "Noble six hundred" suggested "The Charge of the Light Brigade," or "Tennyson"; assign a reason for the suggestion. Close your eyes and "let your thoughts throng on you as they will," in succession. Do not endeavor to control the series, but allow one idea to call another up without any special effort on your part.

Perform other similar experiments and note the relation between the successive ideas.

Does any idea ever arise spontaneously in your mind, the idea having no connection whatever with preceding lines of thought? Give a number of examples to show that such is seldom (if ever) the case. Why then is not our mental life during consciousness one unbroken series of associated ideas, each suggested by the preceding? In other words, what is it that interferes with the complete predominance of association? Give examples to show that by an effort of the will you can change the mental current.

C.—Conditions of Association.

I. The Uniting Activity of Mind, Integration.

(a) *Simultaneous Integration.*—When you look at an object, *e.g.*, an apple, what elements enter into the mental picture? Can you think of the color and nothing else? Make a list of all the elementary factors—Intellectual, Emotional,

Volitional—which enter into the contest of consciousness during one brief act of attention.

Give examples to show that the mind has a tendency to unite all elements in consciousness at the same time into one complex whole.

(b) *Successive Integration*.—Are the mental states in a train of thought separate and distinct, or does each mental complex seem to dissolve into the succeeding and unite with it? Give examples to show that the mind has a tendency to unite *successive* elements; that is, that in the flow of consciousness each state naturally connects itself with the succeeding state.

2. The Reuniting Activity of Mind, Redintegration.

(a) *Reunion of Simultaneous Elements*.—Call to mind some well-remembered object in your childhood home, *e.g.*, a rocking chair. What other objects do you think of in connection with it? Could you recall the chair without at the same time remembering the room it was in, or something else connected or associated with it at the time of the original presentation? Do you recall in addition to spatial elements, such as the room, other elements which entered into the original experience, *e.g.*, a feeling of pleasure? Why do these ideas now come into consciousness simultaneously?

If they had not been united in the original experience would they come up together in the remembered experience?

Did you, in the original experience, endeavor to unite these elements in consciousness?

A person rowing on a river at night observes a shower of meteors; a few nights afterward he rows over the same course and thinks of the shower of meteors. Was there any relation of similarity, or of cause and effect between the rowing and the meteoric shower? Give other examples to show that

the mind tends without conscious effort to integrate and reintegrate into one complex whole all elements which enter into one experience, no matter whether these elements have an essential relation or not.

(b) *Reunion of Successive Elements*.—Note the number of seconds it takes you to say the alphabet forward. Compare with the time it takes to say it backward. Why do you remember it more readily forward? Give other examples to show that the order in which you have been in the habit of saying and doing things is likely to be the remembered order.

Think of the letter “s” and of some letter associated with it. Why are you more likely to think of the letter “t” than of the letter “b” as an association with the letter “s”? In learning the alphabet, did you unite s and t simultaneously, and afterward t and u? Is the present brief pulse-beat of attention sufficiently extended in time to involve two successive elements? If so, show that successive association is in a sense simultaneous association.

Give examples to illustrate the “Principle of the Association of Ideas,” which affirms that “when two or more ideas have occurred at the same time in consciousness, and one of these ideas is again presented in consciousness, it tends to recall the other with it.”

Show that in all cases of association there is at the same time dissociation.

VI. — HABIT — CHARACTERISTICS, FORMATION, RESULTS:

What do you mean by the term “Habit”?

Mention activities, which you now perform unconsciously, which at one time you were unable to perform without conscious effort. Describe the way in which you acquired one of these habits, *e.g.*, skating.

Give examples of inherited reflex, and automatic activities.

Compare the following activities, pointing out the extent to which Consciousness is connected with each:

- (a) Circulation of the blood.
- (b) Drawing up the foot when the sole of the foot has been tickled.
- (c) Skating, when we are learning to skate.
- (d) Skating, after the habit has been fully acquired.

Discuss the statement: "Consciousness occupies the middle ground between hereditary reflex activities upon the one hand, and acquired habitual activities on the other."

Discuss the statement: "When we are paying attention, we are forming habits."

Results of Habit.—Point out advantages which follow as a result of the formation of habits.

A bicycle journey is taken by two men; one is beginning to learn to ride; the other is an experienced rider. Which rider can make the journey the more quickly?

Which will expend the more energy in making the trip?

Which will have the more freedom to observe the scenery?

Give other examples to show that the formation of a habit always enables us to perform the activity more rapidly and easily than at first and leaves us free for the performance of other unlearned activities.

What would be the result if we were unable to form any habits?

What would be the result if habits were very easily formed and were very difficult to overcome?

Give examples of intellectual and moral habits.

VII.—STAGES OF INTELLECTUAL DEVELOPMENT:

1. Give examples of different ways in which you can gain knowledge.

1. *Sense-perception:*

Experiment.—Close your eyes. Have someone place an object, for example, a chair, in such a position that when you open your eyes you will see this object for the first time. Note the change which takes place in your mind. What new knowledge have you gained regarding the chair since you began looking at it? Why could you not have gained this knowledge with your eyes closed? Through what sense did you gain the basis for this knowledge?

The process by which, on the basis of sensations, we gain a knowledge of objects from which we are now receiving sensations, is called Sense-perception.

Give other examples of Sense-perception.

2. *Memory—(Reproductive Imagination).*

Experiment.—Close your eyes. Try to recall the appearance of the chair you looked at in the former experiment. In other words, with your eyes closed, repeat in consciousness, as nearly as possible, the experience you had when you were looking at the chair.

What is such an act of mind called?

Give other examples of Memory acts.

3. *Imagination.*

Experiment.—Close your eyes. Think of a chair a hundred times as large as the one you saw in experiment 1. Suppose it to have life. Place a horse's head on it, remove it to the summit of a high building, etc.

What is such an act of mind called?

Give other examples of Imagination.

4. *Thought:*

Experiment.—Close your eyes. Examine the truth of the following statement: "A chair is an unnecessary article of furniture in a school-room."

What is such an act of mind called?

Give other examples of Thought.

Point out differences between Sense-perception, Memory, Imagination, and Thought.

Which of these is most prominent in infant life?

Show that as we proceed from Sense-perception upward, we rely less and less upon the senses. In other words, that the development of knowledge is from the sensuous to the ideal.

VIII.—THE DYNAMIC CONCEPTION OF MENTAL PROCESS:

Reconstruction, Attention, Habit.—

Static Conception.—Some writers have held what may be termed a Static or Faculty view of mental activity. According to this view, mind and matter are distinct and unrelated. We may have an act of Intellect without any Emotional or Volitional accompaniment. The phenomena of consciousness may be examined as finished products without regard to their origin or destiny. Perception, Memory, Imagination, etc., are isolated and independent faculties, each requiring its own special treatment.

Dynamic Conception.—The tendency of modern Psychology is towards what may be termed a Dynamic or genetic functional conception of mental process, distinguished mainly by three distinct characteristics.

(a) *The Unity of all Experience.*—In our experience, we always find mind and matter closely related in the psychophysical organism. In every pulse-beat of Consciousness we have involved implicitly or explicitly all mental phases, faculties and processes, and the proper training of one assists in the development of all the others. Further, there is an element of identity which persists through the entire life.

(b) *Constant Change of Experience*.—We are conscious of a constantly *changing* mental experience. The mind never remains exactly the same for two successive moments. The instant we attempt to hold and examine a mental state, it is replaced by another. We can compare, only by an act of memory, and what we can do most satisfactorily in Psychological study is to note mental changes and the ways in which they are brought about.

(c) *A Continual Reconstructive Process*.—In the body there is a constant break-down of tissue, called Katabolism, and an upbuilding called Metabolism, by which the body constantly undergoes reconstruction.

This reconstructive process is not haphazard, but functional. Without it there could be neither life nor activity.

A somewhat similar condition prevails in the Psychical life. It is important to observe not only that there is change, but that this change is purposive. No one cross-section of consciousness can be studied as isolated. We must always ask ourselves the question, "Out of what previous condition has this developed and whither does it tend?" The individual has aptitudes, interests, purposes and ideals, and moves forward to their attainment. There are obstacles to such attainment demanding mental reconstruction. In the higher activities of attention we are explicitly conscious of a definite purpose to be achieved, an obstacle presented, a bringing to bear of past knowledge or experience in order to interpret and reconstruct, and finally of moving forward to a new experience different from the former condition. In the earliest stages of infancy we find a similar reconstructive process of low degree, but implicit as regards conscious initiative.

The Dynamic conception has a tendency to simplify the differentiations of previous times, some of which we have already considered, and to make Attention and Habit fundamental. According to this view we find ourselves always in

a definite given situation with certain aims, habits and environment. We select and attend to that which requires reconstruction. We bring to bear our former experience, image, or habit, upon the interpretation of this new presentation, thus a reconstruction is effected and a new habit is formed.

The word habit in this connection means a capacity for doing something in an easier way as the result of having formed a similar co-ordination at a previous time. Habit is thus an attitude of mind, a way of looking at things and understanding them.

In the process of reconstruction we use former habits in the formation of new ones. The term Image has been used by some as meaning a habit, thus used in the construction of a new habit.

Using the term "Habit" in this wider sense, we find that the teacher's main business is to train the child in the formation of correct habits of Sense-perception, Memory, Imagination, Thought, Appreciation and Choice; and that the acquisition of that knowledge which is of the most worth is a necessary aim and result of such training.

We have adopted this terminology (Sense-perception, etc.) as historic, and already somewhat familiar to the reader in everyday experience. We shall find, however, that such terms are purely arbitrary and that the interpretation sometimes put upon them is subject to the foregoing modifications.

We shall proceed to an analytic discussion of these respective departments and to a deduction of resulting educational principles.

IX.—EDUCATIONAL APPLICATION:

State a number of Educational Principles which follow as a result of our investigations in previous chapters.

Give definite school-room applications of each of the following:

- (a) The child is a self-active being, constructed on a principle of change, reconstruction and development.
- (b) This development may be directed upon different lines from those which it would naturally follow, and by disuse certain tendencies seem to become atrophied; but, nevertheless, the intrinsic reconstructive tendency of every state of consciousness to pass beyond itself into a different state is bound to assert itself, no matter under what conditions the individual is placed.
- (c) The child possesses interests, capacities, tendencies, impulses, which, if appealed to, furnish activities of development with least resistance.
- (d) The secret of active interest is adaptation.
- (e) The Unity of Interest in later infancy may be said to be play, in childhood the attainment of skill in controlling a sequence of events, and during youth the investigation of underlying principles and wider relations.
- (f) The mind has a tendency to repeat a former activity in the order in which the co-ordinations were previously made. Repetition increases this tendency, and thus habits are formed.
- (g) Education consists in the formation of habits, and the highest type of education trains to habits of selecting those things which are of most worth and attending to them in the best way.
- (h) The reconstructive process is affected by the nature of the individual, his environment and the kind of effort he puts forth.
- (i) Reconstruction is accompanied by expenditure of energy, and if continued for a sufficient time, produces fatigue.

- (j) The young child is not capable of prolonged or vigorous effort in one direction.
- (k) Change of stimulus gives rest.
- (l) Attention to the overcoming of the right kind of difficulty is always accompanied by a feeling of satisfaction.
- (m) Growth of attentive power is accompanied by a development of desire, knowledge and insight.
- (n) One of the functions of attention is to develop new and permanent interests.
- (o) Bodily weakness or peculiarity of temperament may render vigorous attention impossible.
- (p) It is impossible to attend without something to attend to.
- (q) It is difficult to attend when the material presented is too familiar or unfamiliar.
- (r) It is difficult to attend when the conditions under which the learner is placed are unfavorable to physical or mental well-being.
- (s) The way to teach the child to be attentive is to supply the best materials and conditions for the reconstructive activity.
- (t) It is not sufficient for the mind to be brought in contact with the material; it must act on the material presented.
- (u) By bringing the child in contact with those subjects which have to him the highest value, the attention will be not only secured, but retained.
- (v) The intensity and continuance of an act of attention will be conditioned by the quantity, quality and intensity of the stimulus and the reserve power, desire and effort of the learner.
- (w) Judicious questioning is an aid to attention.
- (x) Good habits of attention can be developed by a

desire to form such habits, by a rational exercise of the attentive activity, and by permitting no exceptions while the habit is being formed.

- (y) The consciousness that one is not the slave of old habits, but can put forth effort in the successful formation of new habits, is of great value to the learner.
- (z) In training the habit of attention, the following should receive special emphasis:
 1. The selection of only those things which are worth attending to as a result of a consideration of educational and practical values.
 2. The power of adjustment to a new problem by calling into the foreground of Consciousness a store of ideas akin to the subject in hand, and by concentrating energy upon the main subject and shutting out all irrelevant sensations and ideas.
 3. The selection of only those representative ideas which will aid in reconstruction.
 4. The establishing of permanent relations by keeping the mind moving along related points.
 5. The habit of continuous effort, established by holding the mind rigidly to a definite line of investigation for a definite period of time.
 6. The grasping of large wholes in one act of attention.
 7. The acquisition of valuable knowledge.
 8. The practical application of the knowledge gained.

CHAPTER VI

The Psycho-physical Organism

What effect does the reception of bad news exert upon the appetite?

What effect does fear exert upon the power to do physical work?

What effect does an aching tooth exert upon the power to do mental work?

Give similar examples of the effect of the Physical on the Psychical and *vice versa*.

Explain the educational importance of having "a sound mind in a sound body."

The question of the relation of mind and matter has occupied the attention of Philosophers for centuries. It is a problem of Metaphysics rather than of Educational Psychology, and we shall not attempt to investigate it. We shall take for granted the reality of both mind and body and shall confine our attention to them as united in the Psycho-physical Organism of our life experience. As we have already seen, our experience is always that of a self-active, undivided personality moving forward in the attainment of its life purposes. In our analysis of conscious process we shall find it convenient at times in this and succeeding chapters to consider elements as separate which are never found thus isolated in consciousness, *e.g.*, on p. 63, we speak of e_1 as representing a Sensation. It is important to bear in mind that such abstraction and differentiation is made solely for purposes of investigation, and that a sensation never appears by itself thus differentiated, but is only one aspect of a complex process involving all other mental activities.

I.—THE NERVOUS SYSTEM:

A person rings a bell where you can hear it and at the same time holds up a red card where you can see it. Describe the changes in your consciousness which result from these acts. Describe the bodily organism by means of which you heard the sound of the bell, and that by means of which you saw the red color. Point out differences between the ear and the eye and show that each is adapted to the special work which it performs. Describe the Nervous System. Procure specimens of eye, ear, brain and spinal cord, and dissect them. By such dissection and with the assistance of textbooks obtain a working knowledge of the genesis, structure and function of the nervous system.

The Special Senses.

Name five senses.

Muscular Sense.—Lift a weight and cause the muscles of the arm when lifting to twist or roll upon one another. Note the peculiar sensation. Similarly roll the eyeball and note the feeling. Such sensations are called Kinæsthetic and are said to belong to the muscular sense.

When the optic nerve is mechanically stimulated (*e.g.*, when a heavy blow is received on the head), what sort of sensation results? When the same nerve is electrically stimulated, what is the result? Can stimuli of any kind, applied to the optic nerve, result in any other sensations than those of light and color? Can a stimulus acting upon any other nerve produce sensations such as come to you from a different sense? Why may "touch" be considered to be "the foundation sense"?

Point out differences between a sensation of hunger and a sensation of sight.

Senses such as sight, hearing, etc., the nerve endings of which are exposed to external stimulus, are called *special* senses. Senses such as hunger, which aid in administering to the needs of the body, are called *general* senses.

Point out distinctions between these two classes of sensations.

Sensations from the special senses are always occasioned by stimuli, and the stimulus normally acts on the end organ in some form of *motion*.

"Vibrations of a lower rate than about 24 per second affect us only through the sense of touch. Above this rate, and up to 40,000 per second, we have sensations of sound. The pitch of the tone is measured by the number of vibrations per second, 40 giving the lowest bass notes, and 40,000 the shrillest sound which can be heard. Doubling the number of vibrations of any tone produces another tone an octave higher. The pitch of the human voice is ordinarily between 87 and 768 vibrations per second, or within a range of a little more than three octaves, while the human ear can take in eleven octaves (40 to 40,000 vibrations). The intensity or loudness of a sound depends on the amplitude of vibration of the sounding body, a violin string bowed gently gives a faint sound, and bowed strongly, gives a note of the same pitch, but louder.

"Colors are produced by ether waves, which succeed one another at the rate of 392 millions of millions times per second, increasing through orange, yellow, green, blue to violet, whose rate is nearly 800 millions of millions per second. To lower or higher rates of vibration than these the eye is not sensitive, though the lower produce electrical and thermal changes, and the higher have chemical effects. The color scale of vision thus corresponds to the scale of pitch in sound. In sight, as in sound, the intensity of the sensation depends on the amplitude of the wave, large waves giving rise to a bright light and small waves to dim light."

Consider the following:

In the body there are white thread-like substances called sensory nerves, whose function is to carry messages to the brain, and other similar substances, called motor nerves, which carry messages from the brain to the muscles.

Different sensory nerves respond to different kinds of external stimuli (light waves, sound waves, etc.), and each nerve is furnished with an end organ (at the surface of the body) constructed in such a way as to receive the particular form of stimulus to be transmitted by that nerve.

It has been found, also, that certain fairly well-defined localities of nerve action in the brain are the organs of definite sensations and movements. For example, Broca's convolution in the frontal region of the left hemisphere is the speech centre. An injury to that portion of the brain causes motor aphasia, that is, the loss of the power of speech without loss of voice or paralysis of tongue or lips. In general, on the sensory side the occipital lobes are the centres for sight, the temporal lobe is the seat of hearing and probably of smell, while taste and touch are, as yet, not very satisfactorily located. On the motor side the convolutions in front of the fissure of Rolando are the centres for bodily *movement*.

From the genetic functional standpoint, we find that we have a development of the nervous system in increasing complexity from lower to higher forms of animal life, and that at every stage the nervous system has definite and important work to perform. The lowest forms possess a very simple nerve structure, with no definite organized centre of control. The nervous system, consisting of brain and spinal cord, appears in its most elementary form in the lowest vertebrates, and in more complex form in each higher class of vertebrate until it reaches its highest specialization in man.

The growth of the brain is most rapid during the first years of life. The maximum weight of brain is reached by males

at about fifteen, and females at about ten years of age. The brain continues to change throughout the entire life process, and there is reason to believe that all psychical change is accompanied by corresponding nerve change.

II.—SENSATION:

Analysis.—What names are given to the three aspects of every consciousness viewed as knowledge, feeling and self-activity? What name is given to the lowest form of Intellectual activity? Consider what is involved in Sense-perception. Have someone hold up before your eyes an object which you have not previously seen (*e.g.*, an apple). Certain changes take place in the mind as the result of seeing the apple. Describe these changes as fully as you can. What new knowledge have you gained? Will your mind ever again be the same as it would have been had you not seen the apple? Through what avenue did the feeling which was the basis of this knowledge come? Analyze the way in which the first change in the mind was brought about as a result of the apple being presented.

What was first affected by the apple?

What was affected after the ether?

What was affected after the eye?

What was affected after the optic nerve?

What was affected after the brain?

Why would you not have seen the apple if any one of the following changes had taken place, though all the other conditions were fulfilled?

(a) If the apple were removed.

(b) If the room were very dark.

(c) If you were very near-sighted.

(d) If your optic nerves were severed.

(e) If you were unconscious.

In what way did the apple affect the ether between your eye and the apple?

Describe the way in which the light wave motion transmitted to the ether from the apple affected your eye, etc., producing at length a change in consciousness. Was the motion of ether from the apple to the eye the same at any two successive periods, *e.g.*, at any two points of a wave? Let a_1, a_2, \dots, a_n represent the successive stages of the motion passing from the apple to the eye, a_1 being the ether wave immediately from the apple and a_n the wave immediately before entering the eye. (This motion from the apple may be called stimulus. Let b_1, b_2, \dots, b_n represent the changing stimulus at various stages in passing from the front of the eye to the retina. Let c_1, c_2, \dots, c_n represent the stages along the optic nerve. Let d_1, d_2, \dots, d_n represent the stages through the brain. Let e_1, e_2 , etc., represent resulting changes which take place in consciousness, e_1 being the first mental change. Through what other sense organs could you receive stimulus from the apple such as to cause mental change? Examine changes in consciousness produced by means of the other senses, *e.g.*, with eyes closed, feel the apple carefully with the hand and note resulting mental changes. Examine other objects with a view to comparing avenues of approach from the external world to consciousness through different senses, and tabulate results under the following heads: Sense, Object, External Medium, Sense Organ, Nerve, Brain, Consciousness. Complete the following table as fully as you can and compare the corresponding stages in different cases:

Sense	Object	Medium	Sense Organ	Nerve	Brain	Consciousness
Sight	Apple	Ether $a_1, a_2 \dots a_n$	Eye $b_1 \dots b_n$	Optic $c_1 \dots c_n$	$d_1 \dots d_n$	e_1, e_2, e_3, e_4
Hearing	Bell	Air $f_1 \dots f$	Ear	Auditory $h_1 \dots h_n$	$i_1 \dots i_n$	j_1, j_2, \dots
Temperature	Hot iron					v_1, v_2, \dots
Smell	Musk					t_1, t_2, \dots
Taste	Sugar					y_1, y_2, \dots
Touch	Desk					o_1, o_2, \dots

The mental affections or states designated by e_1 , j_1 , o_1 , t_1 , y_1 , and v_1 , are called Sensations, and they are the only sensations in the sequences of changes represented in the foregoing table, *e.g.*, in all the changes from a_1 to e_4 , there occurs but one sensation, and that is the psychical change represented by e_1 . Take other examples and note carefully the stage at which the sensation occurs. Compare these sensations and point out similarities and differences with a view to forming a definition of "Sensation."

What can you say about the Sensations e_1 , j_1 , o_1 , t_1 , y_1 , and v_1 , that you cannot say concerning any of the preceding changes, for example, d_n ? Are these sensations Material (Physical) or Mental (Psychical)?

What can you say about e_1 , j_1 , o_1 , t_1 , y_1 and v_1 , that you cannot say about e_2 , j_2 , t_2 , y_2 , and v_2 ?

Are these sensations Immediate, that is, was the antecedent in each case a Physical stimulus, or are they mediately received, *i.e.*, was there a mental process intervening between d_n and e_1 , and between i_n and j_1 ?

Compare these sensations with the state of the mind when remembering an object, *e.g.*, an apple. Is a sensation representative, *i.e.*, based upon a former presentation, or is it presentative, that is, formed of original elements?

In order to receive a sensation from an external object, what conditions must be fulfilled—Physical, Physiological, Mental? If you have a sensation of toothache or hunger, how would the conditions differ from those you have examined?

In experiencing a sensation, is the stimulus from within outward, or from without inward?

If we were deprived of all our sense organs, what means would we have of gaining a knowledge of the external world?

Why is it important that we should have a knowledge of the external world?

Definition.—Write a definition of “Sensation.”

Examine the following:

“A Sensation is any mental state which arises from a bodily stimulus and upon the basis of which we get a knowledge of the world around us.”

“Sensations are psychological phenomena which result within the mind immediately from impressions upon the senses.”

“A Sensation is the elementary consciousness which arises from the reaction of the soul upon a nervous impulse conducted to the brain from the affecting of some nerve-ending by a physical stimulus.”

“A Sensation is not the simple affection of the soul by some bodily change, although the affection is a necessary pre-requisite to Sensation. The Sensation is the state developed by the soul itself upon the occasion of this affection.”

“The function of Sensations is to furnish us with elementary symbols of various things in the world about us which stimulate our sensory-motor activities, *e.g.*, odors, colors, sounds, etc.”

Sense stimuli of which we are not conscious.—Give examples of sense stimuli which were acting upon the end organs of your nervous system a moment ago, but which were not noticed by you. Why did you not notice them?

Inhibited Stimuli.—In infancy the pressure and friction of the clothing upon the skin causes irritation and annoyance. Why is this not the case in adult life? Give examples of other stimuli which you shut out as the result of habit. Perform an experiment to show that you can shut out or inhibit certain stimuli as the result of voluntary effort.

Point out the advantages of being able to inhibit sensations.

Describe ways in which such a habit may be formed.

Give examples of stimuli which are unnoticed because (a) they are not intense, (b) they are not important, (c) we have formed a habit of inhibiting them, (d) we make an effort to inhibit them.

Sub-conscious Attention to Stimuli.—A miller is so accustomed to the sound of the grinding of his mill that he hears his visitor when speaking in an ordinary tone of voice, while the visitor, impressed with the noise, talks loudly in order to make the miller hear him. If a stone happens to grind improperly, who will notice the change in the sound of the grinding first? In what sense is the miller paying more attention to the sound than the visitor is? Is the miller conscious that he is thus paying attention? Can you study as well in a room where a clock is ticking, as you can if the clock is stopped—even though you are not conscious of the ticking? Give other examples which seem to show that attention may be given to sensations which do not seem to be within the threshold of consciousness.

Conscious Attention and Response to Stimuli.—A person enters a dark room with which he is not very familiar and, after some searching, finds the gas jet and lights the gas. Describe in a general way the probable changes in his consciousness from the time when he enters the room to the time when he lights the gas. State certain sense stimuli to which he is likely to attend, and others which he will inhibit. Give reasons for the selection. If he comes in contact with a chair in the dark and hurts himself, why does he pay attention to the injured part? Would it be better if we had no pain sensations? What is the function of pain? If he moves his hand along the wall in search of the gas jet, does he have in his hand and arm an anticipatory feeling, similar to that which he experiences when he actually touches the gas jet? Is there any difference between the sensation you receive from

a gas jet which you touch when you are looking for it, and one which touches you when you are not looking for it? Are you always receiving sensations when awake? Are you always expecting to receive other sensations?

Examine your definition of Sensation in the light of the foregoing examples and of the suggestions on page 53.

Consider the following:

Some such analysis of Sensation as we have adopted on pages 62-64, will assist us in gaining an insight regarding the sequence of changes which must take place in the comparatively instantaneous and unconscious act of the reception of sense stimuli.

An attempt to frame an adequate formal definition of Sensation, however, is met with the following difficulties:

1st. There are countless external stimuli which come in contact with the end organs of the nerve, which are never noticed by us. It is agreed that a sensation must always be psychical, but (as has been pointed out) there are many occasions in which we do not know what is the effect (if any) which the stimulus has upon conscious experience.

2nd. A sensation never exists by itself. It is only a part or element of the content of consciousness at any given time. It differs from other elements in that it is occasioned by the immediate action of stimulus upon the end organ of a nerve, and furnishes a basis for knowledge of external objects. It may, therefore, be said to be a presentative element of consciousness.

3rd. What we have in consciousness is not a series of isolated things, but a constantly changing process, and Sensation is therefore not a part of a static conscious content, but rather an aspect or phase of a reconstructive conscious process.

4th. Sensations are seldom, if ever, received in a haphazard way. While it is true that the stimulus must come in contact

with the end organ of the nerve it is equally true that the individual must receive and act upon the stimulus, otherwise there is no sensation. Certain sense stimuli are selected from others as worthy of attention. These stimuli may *demand attention*, as in the case of pain sensations, or they may be *eagerly sought for*, as in the case of the search for the gas jet in the foregoing example. The forms of response which the self-active individual makes to different received sensations, varies from the passing glance of sense-perception to vigorous and continued muscular and mental activity.

III.—FORMS OF RESPONSE TO SENSATIONS:

A.—Sense-perception.—

Analysis.—Consider the way in which the mind acts upon sensations in gaining a knowledge of the external object which furnishes the sense stimulus which occasions the sensation.

Have some object which you have not previously seen, (*e.g.*, an orange), held up before your eyes near enough to be distinctly seen, but not close enough to admit of the exercise of any other sense upon it. Describe the color, form, size, distance, smell, taste and touch. What kind of sound would it make if it were to fall on the floor? Is it spherical? Have you seen the other side of it? How do you know it is spherical when you have not seen the other side? Would it be possible for a skilful artist to paint a flat surface so as to cause you to think you were looking at a real orange? With what other sense can you test whether the object you are looking at is spherical or flat? Could an artist paint the surface so as to deceive you in regard to the color, *e.g.*, could he make a blue surface look yellow to you? Why do you think this orange is sweet, hard, etc.?

Make a list of the properties which you ascribe to the

orange, based on sensations which you are now receiving directly through the sense of sight, and another list of properties based on sensations which you think you would have experienced if you had used your other senses in examining the orange.

You find that the sensation of color came to you directly through the sense of sight; point out the way in which this sensation caused you to think that the orange was hard, smooth, spherical, etc. Would you have so interpreted this color sensation if you had never had any previous experience in looking at objects? Name other objects within your field of vision from which you are receiving color sensations at the same time that you are receiving color sensations from the orange. Can you look at an orange without seeing the color of surrounding objects? How and when did you separate the one from the other?

Do you have the idea of the orange as separate, that is, can you differentiate it from the other ideas and consider it by itself, analyzing it, etc.?

Which did you think of first, the color or the smoothness? How does the idea of the orange differ from the idea of virtue, or the idea of a centaur? Are you conscious that the object observed is not imagined or remembered, but is now located definitely in space?

Describe as fully as you can the action of the mind in the brief interval which elapsed between the time of the first reception of all the crude, undifferentiated color sensations coming from the entire field of vision on first opening your eyes, and the time when you perceived the orange as a definite known object in space.

We find that when we first open our eyes, a number of sensations beat upon consciousness, some from sight and some from other senses.

Of the sight sensations, some were from the orange and

some from other objects. The color sensations from the orange were quickly discriminated from all other sensations and, in the light of past experience, were made the basis for the interpretation of other sensations which we might have received had we used other senses in examining the orange. Finally, these were all united as qualities of one object, called an orange, located definitely in space and now seen and known by us.

Make a similar analysis of the way in which you gain a knowledge of other objects upon the basis of sensations, for example, when blindfolded, note the way in which by feeling an object, you can discover that it is an orange. Such action is called Perception (sometimes Sense-perception) and the result in consciousness is usually called a Perception or a Percept. It will be noted that perception is not limited to the sense of sight; we can *perceive* an object through any of the senses.

Definition.—Write a definition of Perception.

Examine the following: "Perception is the act of interpreting sensations in such a way as to give us a *knowledge* of external objects."

"The consciousness of particular material things present to the sense is called Perception."

"Perception is the apperceptive or synthetic activity of mind whereby the data of sensation take on the forms of representation in space and time."

"Perceptions are mental contents due to the joint activity of sensation and apperception."

"The perceived thing is not simply the physically present vibrations of atoms and molecules which we call light or sound or what not. It is these vibrations as they are interpreted by the psycho-physical organism which exposes to them a nervous system already affected by past experiences that

enable it to get only certain specific kinds of results from the present syntheses."

"Perception is the gateway through which the mass of sensory excitations (save those grown purely habitual) must pass before they can be permitted to set up responses of the volitional kind."

Fig. 1

Interpretation of Sensations.—Describe what you see in Fig. 1. Is your perception of this object (that is, your knowledge of this line as a definite object in space from which you are receiving sensations of a black color) different from the sensations upon which the perception was based? In what ways have your past experience and education contributed to the formation of the percept? How long does the line seem to be? How far is it from your eye? Why is there less apperception involved in this case than there was in gaining the perception of the orange?

Examine Fig. 2. Describe what you see. Does the figure appear cubical? Are the lines all in one plane? Why does the line B F appear to be in a different plane from the line A B? If the figure be

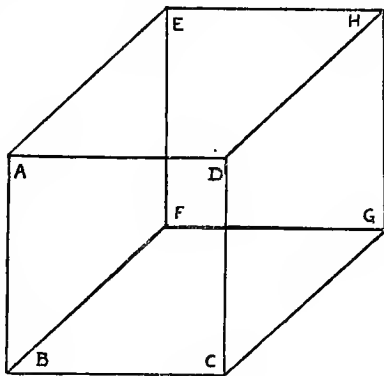


Fig. 2

cubical, how many degrees are there in the angle A B C? If at first sight Fig. 2 seemed to be the picture of the outline of a cube, how do you account for the fact that you considered the angles A B F and A B C each to be equal to 90

degrees, when $B F$ is really in the same plane as $A B$ and $B C$, and therefore the angle $A B F$ is part of the angle $A B C$?

Examine Fig. 3 in a similar way. Describe the lengths of lines in each figure? Is it more or less easy to see the figure as a cube when drawn in perspective as in Fig. 3, than when drawn with equal edges, as in Fig. 2? Why?

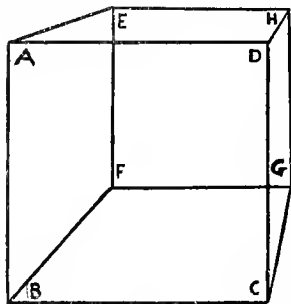


Fig. 3

Hold a piece of glass between your eye and a cubical aquarium with glass faces and black metal edges, and mark off on the glass in your hand the lines which lie between your eye and the edges of the aquarium. In what respects does

the picture you have drawn on the glass resemble Fig. 3? In what ways has past experience assisted you in interpreting the twelve lines in one plane in Fig. 3 in such a way as to give you a perception of a cubical block?

If in Fig. 2 the face $A B C D$ seems nearer to you than the face $E F G H$, reconstruct the perception so that $A B C D$ is at the farther end of the cube and $E F G H$ at this end.

Similarly reconstruct the perception of Fig. 3.

Observe Fig. 2 and interchange $A B C D$ and $E F G H$ as rapidly as you can. Then observe the figure without any effort at reconstruction. Do you find that the shifting process continues and occurs at regular intervals?

Close the book. Make up your mind that when you open the book and look at Fig. 2 you will see $E F G H$ as the face nearest to you. Open the book and look at Fig. 2. Does the observed figure conform to your preconceived perception? Give examples where desire and expectancy have

caused persons to think they have seen what they really have not seen.

Illusions.—Examine Fig. 4. Which of the lines A B and C D appears the longer? Measure them. Why does C D look longer than A B when they are both the same length? Draw lines of equal length and at the ends draw forked lines as in Fig. 4, and note the result. Does the attention at the point A, in order to continue along the forked lines, seem to retrace its steps and eliminate a portion of the vertical line, thus shortening it?

Cut a piece of grey paper into pieces, each one inch square. Place these grey pieces at the centre of differently-colored card boards, giving backgrounds of red, yellow, green and blue, respectively, the lower paper or cardboard in each case being not less than three inches square. Place a piece of white tissue paper over all. Note the phenomena. How do you account for the apparent differences in shade of the three pieces of grey paper? Are these differences due to contrast with adjacent objects of different color?

Attentions to Perceptions.—An artist spends days or perhaps weeks in studying one of the great masterpieces of art. Is he simply gaining Sense-perceptions? What more is he doing? Why may a great painting be said to be valuable, not so much for what it is in itself, as for what it stands for (its ideal significance)?

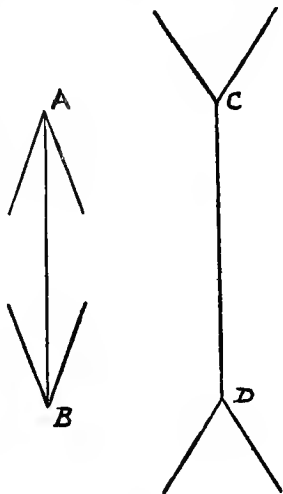


Fig. 4

Take some common object, for example, a house, and point out differences between the interpretations which a civilized and an uncivilized man will give of sense stimuli received from the same object? To what is this difference of interpretation due? Give other examples to show that sense-perception is only the first step in the study of objects and that one of the purposes of education is to invest objects with a manifold of meaning over and above mere perception.

Consider the following:

In sense-perception there is a response to stimuli coming in contact with the end organ of a nerve, and as a result of this responsive activity certain stimuli are selected from others and interpreted in such a way as to give us knowledge of an object definitely located in space. Sensation is the most elementary form of psychical activity. Sensation and Perception are simply two stages in the same process and cannot be consciously separated. In Perception the sensation is given meaning through interpretation based upon past experience and present attitude. Perceptions are further interpreted and reconstructed into the higher forms of Imagination and Thought, the development being from presentative to representative, from sensuous to ideal.

B.—Muscular Activity in Response to Sense Stimuli.

1. *Physiological Reflex*.—A physician tickled the sole of the foot of a patient whose spinal cord had been seriously injured; the foot was immediately withdrawn. The physician said: "Did you feel when I touched your foot?" The patient replied: "I felt nothing, I only noticed that my foot moved."

Give other examples of muscular activity in immediate response to sense stimulation without any apparent accompanying change in consciousness.

2. *Sensation Reflex*.—If you inhale snuff under certain conditions, you cannot keep from sneezing. Are you conscious that you have received a sensation and are unable to prevent a muscular response?

Give other examples of conscious but uncontrolled muscular response to sense stimuli.

3. *Semi-sensation Reflex*.—Compare the spontaneous act of coughing as the result of tickling in the throat with the act of keeping from coughing under similar circumstances.

Give other examples of acts where we are sometimes able to gain control of the response and sometimes fail in our effort.

4. *Habitual Reflex*.—Walk across the floor and notice the accompanying foot and joint sensations. If you did not receive these sensations, could you walk as expertly as you now do? Why not? Why can you walk and at the same time think of something else? Why could you not do this in childhood when learning to walk? Before you step do you have an idea in your mind of how it will feel when you take the next step? Give other examples of unconscious reflex action through habit?

5. *Consciously Controlled Sensory-motor Activity*.—Compare the method of giving response in the reaction time experiment outlined on page 23, with the reflexes just considered.

Give other examples of conscious muscular response to sensory stimulus.

Is all manual labor sensory-motor?

IV.—SENSITIVENESS AND SENSIBILITY:

Lay your open hand palm upward on a cushion and close your eyes. Have someone lay a small piece of paper or other very light article very gently upon the palm. Have you a corresponding sensation? Under the same conditions, have heavier pieces dropped, until you find the lightest weight

which you can notice. This weight is said to be your threshold for touch, and it measures your sensitiveness.

Now place on your hand a heavier weight, say 13 lbs., and have someone put on an additional half-pound weight. Do you feel any change? Instead of the half-pound weight put on heavier weights until you notice the change. The difference of stimulus necessary to produce a change of sensation is called the difference threshold, and measures sensibility.

Try another weight, say 26 ozs., and notice the difference threshold. Perform a number of experiments to find what relation this difference bears to the weight on the hand.

Experiment similarly for active touch, that is, instead of having the hand rest upon the surface, move it up and down to lift and "heft" the weight.

Speaking generally, the difference threshold is one-thirteenth for passive and one-nineteenth for active touch, whatever be the initial weight.

What would be the effect if additional weights less than the difference threshold were put on very slowly? The foot of a frog has been pressed to a jelly in this way without any apparent pain. Why would it be impossible under normal conditions for anyone, simply by lifting, to distinguish a 12 pound from a $12\frac{1}{2}$ pound weight? Can difference threshold be reduced by training? The measurement of sensibility and sensitiveness to intensity of *sound* may be made by having a very light shot dropped on the table by the experimenter, the observer being stationed some distance away. The faintest sound that can be heard indicates the observer's sensitiveness, and the slightest perceptible difference in sound measures his sensibility, the height from which the shot drops being an index of the intensity of the sound.

The test for just observable differences in the pitch of notes may be made with a tone tester, or with tumblers partly filled with water. Perform these experiments.

If the temperature of your room were to rise one-fourth degree in one minute, would you notice the change? What would the result be in three hours? Frogs have been boiled in this way without apparent pain.

What is the exact test of change of temperature? Apart from the thermometer, do you notice any changes in appearance and action of the individual as a result of too high a temperature? How do these symptoms compare with those of a person who is over-fatigued?

V.—SENSE TRAINING:

Find out by experiment (using an ordinary prism or pieces of colored yarn) with children of five years of age, the number of different colors they can discriminate. How many colors can you discriminate? To what extent is the difference between your color discrimination power when you were five years of age and at the present time due to (a) Natural growth and development, (b) Environment, (c) Education?

Herschel computed that the workmen upon the mosaics of Rome were able to distinguish over thirty thousand different color tones.

Could every person learn to distinguish this many colors?

Is it likely that any one of these workmen, as a child, could distinguish so many colors? Could he, as a child, have been taught to distinguish them?

If every person were capable of being trained to such high color discrimination, would it be well to give such training to all? Why not?

What are the advantages of the possession of an adequate power of color discrimination? Is it possible for every child, through proper training, to improve his powers of sense discrimination? If taught in the proper way and at the proper time, will the child be anxious to study color, enter into such study heartily and enjoy it?

Give examples of ways in which color training can be given.

Would it be possible to give a blind man, who had been blind from birth, an adequate knowledge of color? Why not?

If a person knew thirty different colors, could you describe a new color different from any of the thirty in such a way that the person would know what the color was like.

About how many colors do you think a child should learn in an elementary school, as the result of a careful study of colored objects presented to his view?

If a person is very near-sighted, how will this fact affect his study of color? What steps should the teacher take regarding the discovery of such defect, the securing of proper glasses, proper seating conditions, etc.? Some pupils are color-blind, *e.g.*, they cannot distinguish red from its complementary blue green, and it has been found that such a defect can sometimes be remedied by training. What is the teacher's duty regarding color-blindness in school.

Compare the size of the smallest eye of a needle into which a child of five years can insert a thread with the size of one which he can thread when ten years of age. It has been found by scientific investigation that the rudimentary or large muscles develop first, and the accessory later, *e.g.*, the large muscles of the arm develop before the small muscles of the fingers. In the light of this discovery, why would it be unwise to teach a child five years of age to discriminate one hundred different colors?

Do all children of the same age possess equal powers of color discrimination? If a child possesses special power in this direction, should he or should he not receive special training in color discriminations?

Perform experiments to determine the proper quantity, quality and direction of light required in order to secure the best conditions for observational study?

Point out ways in which the eye may be trained to distinguish differences of form, size and distance.

What school subjects furnish the best direct training for the sense of sight? What subjects furnish the best indirect training? Make a similar analysis of the senses of hearing and touch.

Proper Sensory-motor Training Should Enable the Child:

1. To form the habit of controlling and directing his natural hunger for sensations into an organized sense-perceptive attitude which will make him alert for sensations of the right kind and appreciative of nature in its highest forms.

2. To gain by the immediate and independent activity of his own powers of sense-perception a store of knowledge concerning things about him and an appreciation of their respective values.

3. To select the proper sensations to which to attend and to shut out those that should not receive attention.

4. To receive the stimulus through the sense or senses best adapted to a clear and vivid impression, and to make the proper adjustment of the sense organ to the reception of the stimulus.

5. To observe accurately and completely, and to discriminate closely between similar sensations.

6. To interpret wisely and independently, using his past sense-perception experiences as instruments of rational insight.

7. To act promptly and in the proper manner in cases where sensations require responsive motor activity.

In Sensory-motor Training the following Dangers of Over-training Should be Avoided:

1. The senses should not be trained at the expense of the higher rational powers.

2. One sense should not be trained to the exclusion of the others.
3. In elementary schools sense training should not receive sufficient attention to develop sense specialists.

VI.—EDUCATIONAL APPLICATIONS:

State educational principles derived from a study of the psycho-physical organism and of the activities of Sensation and Perception.

Consider the following: Point out the educational bearing of each and give school-room illustrations.

Mind and body are inseparably connected, and it is probable that every psychical change is accompanied by a corresponding physical change and *vice versa*.

A sound mind in a sound body is a necessary condition of highest achievement, physical or psychical.

For best mental work the nervous system must be well nourished and well controlled.

Bodily discomfort interferes with mental activity.

Sensory defects, bodily disease or injury are attended by corresponding changes in consciousness.

The sympathetic nerves have much to do with controlling circulation, digestion, etc., and they thus indirectly affect mental life.

Mental fatigue produces bodily fatigue, and *vice versa*.

A cheerful attitude of mind is an aid in recovery from disease and in the performance of physical or mental work.

The body should be symmetrically developed.

Unsteady or vacillating physical habits are usually accompanied by similar habits of attention and choice. [E.]

The expression of the face is conditioned by the content of consciousness.

A nerve structure which has acted once in a certain way, is transformed so as to act in the same way more easily the next time.

Child growth is accompanied by new and more complex co-ordinations, physical and psychical.

The senses can and should be trained.

Sense training should not be prolonged after it has become automatic.

It is impossible to have knowledge unless we first have a basis in sense presentation.

Some form of motion must act upon the end organ of the nerve, otherwise there can be no sensation.

The sense organ must be in a healthy normal condition, otherwise the sensations received will be imperfect.

The sense organ can be injured by incorrect reception of stimulus.

It is injurious to the eye to strain it by endeavoring to see objects at too great a distance, or too close to the eye, or by using the eye vigorously, immediately after an illness.

The quality, quantity and direction of light stimulus affects the color sensation received.

In early years, knowledge is gained mainly through the avenues of the senses and the senses are naturally active.

The sensation material should be adapted to the stage of sense development reached by the pupil.

Some pupils are of the visual, some of the auditory, and some of the motor type.

Some subjects can be learned more easily through one sense than through another.

When a sense is lacking, the other senses may become unusually acute, and generate a power of interpretation which in a measure supplies the deficiency.

Difference threshold can be trained.

In early childhood the power to discriminate sounds, colors, etc., is weak.

The mind must not only receive the stimulus from the nerve, but also act upon it, otherwise there is no definite knowledge gained.

In sense-perception the sensuous data are interpreted on the basis of past experience.

On a very small basis of raw material of sensation, the mind is able by the power of apperception to construct a large superstructure of knowledge.

The muscles can be trained to give quick and adequate response to sense stimulation.

The rudimentary or large muscles develop first, the accessory develop later.

Reaction time can be shortened by practice and by holding the mind in an attentive or expectant attitude.

The temperature sense difference threshold is very wide. If a room is heated slowly enough a person cannot tell (except by the aid of a thermometer) that the temperature of the room is increasing.

Pupils who work in a room at too high or too low a temperature show many of the symptoms (flushed face, headache, etc.,) which accompany over-fatigue.

There is danger of catching cold in a room of too high or too low temperature.

CHAPTER VII

Memory

I.—DEFINITION:

What is meant by the term Memory?

Does an insane person remember?

Does a person remember when dreaming? When a person is walking and does not notice how he walks, would you say that he remembers how to walk?

Is all repetition of past experience, memory?

Recall the following experiences in Perception, taking, in each case, a definite example of Perception which you can clearly and easily remember:

- (a) The sight of an object that you have seen, *e.g.*, a tree. (b) A sound. (c) A taste. (d) An odor. (e) A hard substance. (f) A hot substance. (g) A word. (h) Motor activity. (i) Pain.

A remembered perception is usually called a Mental Image, or a Representative Image.

If the remembered perception of an object perceived through the sense of sight is called a Visual Image, what name might be given to the remembered perception of a sound?

State which of the images, *a, b, c, d, e, f, g*, was visual, which tactual, olfactory, gustatory, verbal, etc.

Examine the statement: "We have as many kinds of images as we have sense organs."

Can you remember something which you imagined at

some time in the past, which had no evidence outside your own mind, *e.g.*, a centaur?

What is the difference between looking at a tree and remembering the tree?

Compare the image with the original perception as regards: (a) Vividness, (b) Accuracy, (c) Source, (d) Conditions of sense nerve, (e) Prominent relations involved.

Consider the following:

The image is less vivid and accurate than the original perception. In the original perception the nerve is stimulated from without. In memory the image is furnished by the activity of the mind on the basis of past experience.

In perception, *space* relations are most prominent; in memory, *time* relations are most prominent.

On page 51 you were asked to perform acts of perception, memory, imagination and thought. Call up as many of the examples then given as you can now remember, and compare the original experience with the recalled idea. Similarly recall an experience where you suffered pain and another where you made an important choice, and compare the representation in each case with the original experience. In all such cases, can it be said that the remembered experience is less distinct and accurate than the original? Is your purpose in the representative act different from your former purpose? Does this affect the character of the representation?

When a witness in court is endeavoring to recall something which is very important, but which has "escaped his memory," how does the condition of his *body* differ from the condition when he experiences no difficulty in remembering?

The term Recollection is sometimes used to denote active memory or the voluntary recall of the past with a definite end in view, as distinguished from passive Reminiscence.

II.—ANALYSIS OF A MEMORY ACT:

Consider conditions necessary for a complete act of memory. What is the first condition?

Can you remember anything which you have not at some previous time learned or experienced? Give examples.

The original experience of getting the idea into the mind is usually called Reception. We can remember an act of Perception, Memory, Imagination, Thought, etc. The original receptive experience, which is the first and fundamental condition of a memory act, is not properly included in the memory act which, strictly speaking, begins after the Reception is completed.

What is the second condition?

Take an example of some building, *e.g.*, a church, which you saw several years ago, and have not seen since, and the appearance of which you can now recall.

Have you remembered this building ever since the time when you first saw it?

Has the idea been in consciousness all the intervening time?

Has the nervous system preserved a trace of the original experience?

What name do you give that power by which the original impression is retained?

What is the third condition?

During the period of retention you were not conscious of the idea at all. You now remember the church as you saw it. Why does this remembered idea arise in consciousness on this occasion?

Give other ways in which ideas of past experience are called into consciousness. The representation of an idea in this way is called Reproduction.

What is the next condition?

Do you sometimes see a person's face without knowing the person and yet with a vague feeling of familiarity, and after a brief interval find the knowledge come to you that the person is one whom you had previously known. The act of becoming conscious that you have at some previous time had the presentation which is now represented in consciousness is called Recognition, and the act of referring the representation to a definite time in the past is called Localization.

Reception is thus the original experience forming the basis of, but not included in, the memory act. Retention is the mental aspect of a modified brain structure which gives the "Permanent Possibility" of a revival of this experience. Reproduction is the actual revival of it in consciousness. Recognition is the knowledge that it is a repetition of a previous experience. Localization is the act of assigning it to the time of the original presentation. The term Recollection is used to include Reproduction, Recognition and Localization.

In a number of examples, point out the periods of Reception, Retention, Reproduction, Recognition and Localization.

Give instances of the Recall of circumstances supposed to have been forgotten. Is it possible that Reproduction may occur without Recognition? Might this be the true explanation of unconscious plagiarism? Do you often seem to recognize a thing as familiar, when in reality you are having a new experience? Is this a possible explanation of Plato's pre-existent state and of Wordsworth's lines:

"Our birth is but a sleep and a forgetting;
The soul that rises with us, our life's star,
Hath had elsewhere its setting,
And cometh from afar;
Not in entire forgetfulness," etc.?

III.—FUNCTION OF MEMORY:

Consider what our mental life would be without the power of memory:

1. *Intellectually*.—Could we form general notions or classify objects? Could we then have logical thought? Would imagination be possible if we had no memory of the materials which it uses? Could we even have perception, that is, could we know an object as such if we remembered none of our previous experiences by which to interpret presented data?
2. *Emotionally*.—Would the emotions be possible in any degree? Should we have any grounds for love or hate? Could we sympathize if we had no recollection of our own experiences? Would æsthetic enjoyment be within our power?
3. *Volitionally*.—Without memory, could we learn to perform any manual operation? Would moral actions be possible? Could we have motives as basis for choice and conduct?

On the other hand, what would be the disadvantages of not being able to *forget* anything?

Memory Values of Different Senses.—Compare the vividness of memory in Sight and Touch by the following experiment:

Look at a straight line (nine inches in length) previously drawn on a blackboard. Erase it and draw another of equal length in the same direction. Now, with eyes closed, run your finger along the edge of a ruler nine inches long. Indicate what you consider to be an equal length on a longer ruler by drawing your finger along its edge.

Which has furnished the more accurate judgment, Sight

or Touch? Perform other experiments to prove that memory is most vivid in sight and hearing.

If anything is properly learned and is repeated often enough, and the mind and body are healthy, can it always be recalled?

Verbal and Rational Memory.—A pupil learned the productions of the United States by rote, first the productions of one State, then of another by a sheer effort of memory. In what ways would the study of the relation of effects to causes have led him to anticipate the productions? For example, to what extent would the knowledge of the relief of a State, its climate and soil, the productions of the adjoining States, etc., have enabled him to conclude what the productions would be? In which of these two methods would the powers of thought have been more fully exercised?

One student learns a proposition in Geometry verbatim, without understanding the proof. Another learns the proof but does not remember the exact words. What name is given to that method of memory which consists simply in memorizing words? Give other examples of verbal memory. What name is given to that kind of memory in which the reasoning or fact-producing principles are remembered, and the exact words unheeded? Give other examples of rational memory. Which method is usually better in learning Mathematics? Why? Point out the evil results of rote memory, that is, of memorizing words without paying attention to the meaning of what is learned.

“Verbal memory may be accompanied by rational.” Give examples. “Facts in history and beautiful selections in literature should be memorized in the exact words of the book.” Defend this statement and make a list of subjects which should be thus memorized. Why is it important that, in such verbal work, the meaning should at the same time be kept in view?

IV.—CHARACTERISTICS OF A GOOD MEMORY:

What do you mean by the term "A Good Memory"?

Criticize the following as Memory Types:

- (a) The learner makes no difference in the values of facts. There is no perspective, all parts of the subject studied are equally prominent. In History, for example, he is as likely to remember the color of the horse on which a king rode to battle as he is to remember the most important event of the king's reign.
- (b) He remembers the exact words of the book, *e.g.*, he can repeat page after page of the text-book in Geometry, but cannot reproduce the thought in his own words.
- (c) He can learn nothing verbatim, *e.g.*, he finds it impossible to memorize a beautiful selection of poetry.
- (d) He cannot forget disagreeable, debasing or useless things, *e.g.*, he constantly broods over some failure in life, his mind is filled with impure associations, or occupied with trivial commonplaces.
- (e) He tries to remember everything, *e.g.*, he blames himself for not remembering the ways in which people are dressed, the number of panes in the windows of houses which he has seen, etc.
- (f) He says he has a poor memory and does not try to remember anything at all difficult, but relies on his note-book for everything.
- (g) He has formed a habit of remembering by mnemonics, and is unable to remember simple facts without establishing an elaborate series of artificial associations.

- (h) He learns quickly, but forgets just as quickly and requires to review very often.
- (i) He has a well-stored mind but is unable to call up the required thing at the proper time.
- (j) His representation is vague, inaccurate, and lacking in important details.

Point out ways in which the teacher can aid in changing such habits as the foregoing to more satisfactory ones. Give an example of an occupation where it would be an advantage to learn quickly and also to forget quickly, and of another in which speed of acquisition is not important.

If a person has a good memory for poetry, does it follow that he will have a good memory for prose?

Consider the following:

There is no such thing as a faculty of memory independent of the thing to be remembered. What the teacher can do is to aid in developing a habit of learning, retaining, and recalling in the best way. The child should form a habit of remembering only those things which are worth remembering and of forgetting others. He should be trained to learn rapidly, to retain for a long time without repetition, and to reproduce accurately and quickly.

Strong retentive power in one direction does not always mean a similar power in other directions. The possession of an abnormal memory, *e.g.*, the power to reproduce long lists of words is not desirable, there should be harmonious development.

V.—MEMORY TRAINING:

Visual Memory Span Test.—Prepare ten series of 12 consonants each, avoiding previous associations in preparing the sequence, *e.g.*:

1st series, x, b, s, f, t, h, r, m, g, l, c, q.

2nd series,	v, k, z, p, g, n, d, m, s, l, f, b.
3rd “	v, s, n, f, c, t, r, p, l, g, b, x.
4th “	d, b, f, h, g, k, p, n, l, t, s, x.
5th “	r, v, h, k, d, c, s, v, r, k, m, g.
6th “	d, s, p, m, g, l, b, f, q, s, b, n.
7th “	y, l, t, r, q, x, m, g, d, k, f, b.
8th “	b, x, c, t, r, f, k, p, l, g, d, l.
9th “	g, c, f, b, l, k, m, r, c, p, q, d.
10th “	k, g, d, m, b, p, h, s, t, r, l, c.

Have the ten series written on a blackboard or tablet covered with a curtain which can be raised when required. Have a student who has not seen the series take a seat where he can distinctly see the letters when the curtain is raised. Tell the student that you will expose twelve letters to his view for ten seconds and that you wish him to remember and subsequently write down as many as possible of the letters in proper sequence. Raise the curtain so as to expose the lowest series. After ten seconds, lower the curtain and have the student write the series as he remembers it. Raise the curtain and have him mark the number that he has right, marking one for a correct letter in its correct place and one-half for a letter transposed. Erase lowest series and proceed similarly with the next series, and so on. At the end of the experiment have the student sum up his marks and find his percentage of the maximum total (120 marks).

Perform a number of similar experiments with different series on succeeding days, and deduce conclusions which will be of service in memory training.

A.—Training Reception.—What is the result if we try to remember everything?

Which is better, the ability to remember accurately a few important facts, or the power to recall in a hazy, uncertain way an immense number of indiscriminate and unimportant

details? Why is it important that anything memorized should be worth remembering? Give examples from Literature, Natural Science and Mathematics.

There are certain conditions which, if observed in getting anything into the mind, will enable us to remember it more easily when we wish to recall it than if we had not observed these conditions. Make a list of all such conditions which you have found to be aids to memory.

What is the first experience of your infant life which you remember? Why do you remember this experience and forget subsequent events? Deduce principles for memory training. "If in the process of learning, the facts are properly apperceived, Memory will take care of itself." Explain the meaning of this statement and give examples.

1. Attention.—Show that aids to attention are aids to Memory.

Give examples where you have forgotten:

- (a) Because you were not interested in the subject.
- (b) Because you did not concentrate your attention vigorously for sufficient time.
- (c) Because you did not understand what was to be learned.
- (d) Because you did not relate the new presentation to former knowledge by bringing related facts into the foreground of consciousness.
- (e) Because you had not formed the habit of memorizing.
- (f) Because your health was not good.
- (g) Because you were over-fatigued.
- (h) Because you did not receive the impressions through the best avenues or sufficiently vividly.
- (i) Because you did not concentrate attention upon the greatest difficulty.

If a pupil spells the word "Island" "Iland," in what ways

could he be taught the correct form? Why should the difficult part be especially emphasized? Why would it be a good device to write the word in a prominent place with the letter "s" specially conspicuous?

Why would it be an advantage to the pupil to write it, to spell it orally, to write it in the air with his fingers, to model it in clay, etc.?

2. Association.—Give examples to show that all aids to association are aids to Memory.

Aids to Association.—Point out aids to the formation of Associations:

- (a) *Order.*—Give examples to show that the order in which things are originally learned is the order in which they are apt to be recalled.

If there are fourteen prominent elements in an original presentation, *e.g.*, the sea, a sailboat, etc., and now only one of these ideas comes into consciousness, *e.g.*, that of a sailboat, is it as likely to recall the others as if a larger number are recalled? Why is this?

- (b) *Vividness.*—From the list of associations which you formed on page 47, select those which were due to vividness of the original impression.

- (c) *Repetition.*—In the list of associations formed on page 47, note those which are due to frequent repetition.

- (d) *Recency.*—Other things being equal, which is the more likely to be suggested, the association formed recently or the one formed long ago, *e.g.*, if you have been equally interested in two books, one of them a year ago, the other this morning, which will probably be recalled now by the word book? Give examples. Why is it wiser for the student

to spend the hour before a Geometry examination in studying Geometry, than in studying History?

- (e) *Attitude of Mind*.—A buttercup is held up before a farmer, a botanist and a person who is from the city for a holiday, what different associations are apt to be called up in each case?

Give examples to show that the profession or calling in life is apt to condition the associations which arise in the mind? When a person is despondent, does it seem to him that people are unusually cold and distant? Give examples to show that our emotions have much to do with the associations formed. Why is it important that in memorizing we learn in the same order in which we wish to recall?

- (f) *The Conscious Union of Contiguous Words*.—In successive associations we found that each mental picture seemed to be associated with the preceding. Endeavor to memorize the following list of words. Begin with the first word, proceed to the second, form an association between the first and second, then proceed to the third, and form an association between the second and third, for the time being, forgetting all about the first, then proceed to the third and fourth, paying no attention to the first and second, and so on. After all the words have been gone over in this way, close the book and write the list as accurately as you can: Telephone, wood, forest, hunter, rifle, steel, rail, railway, station, platform, crowd, picnic, children, danger, dust, destination, dinner, rain, tree, conversation, sunshine, departure, home.

Why do you remember this list of words more readily than an ordinary list of the same number of words?

Why is an association such as that "wood" is found in a "forest," a better association than that the words "danger" and "dust" begin with "d"?

Mnemonics.—The method of remembering anything by associating it with something else which we do not require to remember, but which we easily remember and can easily associate with it, is called Mnemonics. For example, in learning the names of the monarchs of England, some learn the lines:

"First William the Norman, then William his son,
Henry, Stephen and Henry, then Richard and John,
Next Henry the third, Edwards one, two, three,
Then again after Richard three Henrys we see," etc.

In the foregoing example, to what extent are you aided by the rhythm, by the fact that you know how many syllables are still wanting in a line, and by the habit of learning poetry and not prose?

A student wishing to remember that the anterior spinal nerves are motor, and the posterior nerves sensory, remembers that "a" and "m," the initial letters of anterior and motor, occur earlier in the alphabet than p and s.

Recall similar devices which you have used.

Why is a mnemonic association which you have made yourself better for you than one suggested by someone else?

Consider the following methods:

Take a list of unrelated words that it is necessary for you to remember, *e.g.*, the names of students in a class, streets in a town, elements in Chemistry, etc. Associate the first word with the second by some association connected with both and serving as a suggestive link. In this way you will finally have a list of successive associations similar to those in the list in our experiment (telephone, wood, etc.) which you found it easy to memorize. Now close the book and write your list of streets, leaving out the mechanical associations.

Why do these associations aid you in remembering? In what way does the forming of these associations tend to concentrate attention upon the names of the streets and make the impression vivid? After a time you remember the names of the streets when you have forgotten the artificial associations. Why is this?

Why is the use of mnemonics a dangerous device? What would be the effect of trying to remember everything by mnemonics? Why does an extensive use of such devices weaken the memory? Those who have the most vigorous memories do not resort to such expedients. If proper attention is paid to rational apperception, repetition and recollection, Memory as such will take care of itself without the adoption of mnemonic devices.

If a student memorizes daily by a definite act of attention, and increases the amount learned each day, he will soon acquire power to memorize without difficulty.

B.—Training Retention.—Physical Health.—It is probable that all physical action is accompanied by corresponding nerve change, and that as the result of stimulation, response, attention and repetition, nerve tissue takes on a retentive form. A person, after receiving a severe blow on the head, forgot all the events which occurred during the few hours immediately before the accident and never remembered them again.

An uneducated servant, during a fever delirium, recited passages of Latin and Greek which she had heard a gentleman read again and again in his study. She had never endeavored to learn them and did not know their meaning, and when fully conscious, could not repeat them.

Give examples where the memory has been injured through ill-health. Why is the health of the nervous system specially important in the training of Retention?

Repetition.—Which are remembered better in old age, the prominent events of early life or the ordinary events of middle life? Which are the more recent? Which have been the oftener repeated? What effect has repetition upon power to remember? Give examples from your own experience. Why is drill necessary in school work?

Do you learn more quickly and remember better, when repeating, if you attend to the meaning, than if you simply repeat, parrot fashion?

Why may it be said that there is no faculty of memory, that the question, "How should we train Memory?" gives rise to another question, "Memory of what?" What relation does localization of brain function bear to this question?

C.—Training Recollection.—Why is it true that if anything is properly learned and repeated, and the mind and body are in a healthy condition, the Recollection will usually take care of itself?

In order to recall anything, why is it important that for the time being we forget other things?

Can we drive anything out of consciousness by simply willing to do so?

How can we drive undesired ideas out of consciousness?

With what should we endeavor to occupy consciousness in trying to remember?

If in a certain Receptive experience there were forty prominent simultaneous elements in consciousness, and we now recall thirty-nine of these and cast them as nearly as possible in their original relations, why is it likely that the fortieth will come up quickly with them?

Try to remember the name of some person whose name you have for the moment forgotten. Think of his personal appearance, the color of his hair, his mental peculiarities, where you last saw him, who was with him, what he said, etc.

Many people by practice can, by this method, recall almost anything which they have ever firmly fixed in memory. Why is such a method superior to ordinary mnemonics?

Why is it wise to trust the memory and make a determined and continued effort to remember when we once resolve to do so? Why are we likely to fail if we grow excited in the process? Why does anxiety as to results tend to paralyze the mental action of a student at examination? When you have tried hard to remember a word and failed, have you, after a few hours or days, noticed the fugitive word arise in consciousness unbidden? Is it probable that in the original experience there were so many elements engaging the attention that you failed to distinguish the one you sought?

VI.—EDUCATIONAL APPLICATION:

Give examples of school-room applications and violations of each of the following:

If proper methods of learning are followed, Memory, as such, need not be emphasized to any great extent.

That which is learned should always be worth remembering.

The teacher should aid the child in the selection of that kind of knowledge which is of most value.

The Memory should not be overburdened.

The learner should form the habit of remembering different kinds of experience—Auditory as well as Visual, Words and Thoughts as well as Percepts, etc.

The recollection of a few essentials, accurately retained, is more valuable than an uncertain memory of a mass of unimportant details!

In some cases material which has no meaning in itself should be remembered, *e.g.*, the spelling of words.

In some cases the exact words of the book should be re-

membered, in other cases a sequence of reasoning should be remembered.

Facts should be presented in logical and chronological order.

As a rule, it is better to learn in the order in which it is intended to recall.

When learning, it is well to avoid coming in contact with or attending to objectionable stimulus.

Difficult memory work should be taken at such times as the nervous system functions at its best.

In very difficult cases it is well to receive the stimulus through the sensory avenue of highest natural efficiency, but individuals who are of weak visual, auditory, or motor power, should remedy the defect by definite exercise.

Power to memorize in one subject of study does not necessarily mean power to memorize in another subject.

In the case of a weak power of memory, for example, a difficulty in remembering prose, the power can be strengthened by setting to work systematically to memorize a small amount each day and by increasing the amount.

In Reception the primary presentation should be properly apperceived.

The attention should be focussed upon the greatest difficulty and the subject should be clearly understood.

The entire attention should be directed upon the thing to be learned. The impression should be clear and definite, and the images should be such as will furnish effective instruments in the reconstruction of future experience.

One deep impression is more lasting than a superficial impression repeated many times.

Good health favors retention.

There should be frequent reviews of important facts, but repetition may be conducted in such a mechanical way as to be harmful.

It is well to form a habit of recalling vigorously, methodically and persistently.

It is better to be able to recall without the aid of explicit association.

When difficulty arises, an appeal should be made to association, and an association which has worked well once in recalling a fact should be used again.

Memory may receive too much attention.

CHAPTER VIII

Imagination

I.—DEFINITION:

Compare the following types of Imagination:

- (a) An individual imagines the appearance of a landscape from a written description of it.
- (b) He imagines that he is being burned in a fire.
- (c) He imagines a horse with a man's head.
- (d) He builds "castles in the air."
- (e) Coriolanus makes the following salutation to his wife:

"Chaste as the icicle curded by the frost from purest
snow

That hangs on Diana's temple, Dear Valeria."

- (f) Napoleon Bonaparte is said to have taken Julius Cæsar as his ideal.

In which of these examples is the Imagination the most mechanical?

In which is it most constructive?

How does an imagined object differ from a perceived or a remembered one?

Could you draw a picture of an imagined object, *e.g.*, a centaur?

Show that Imagination resembles Perception and Memory in that it has for its product an idea of a particular individual.

Show that it differs from them in that it is not restricted as regards space and time relations, but can be assigned to such place and time as the mind determines.

Show where dissociation and new association occur in the foregoing examples.

Why may Imagination be said to be more ideal than Memory?

In Memory do we remember objects or incidents exactly as they occurred in the original presentation?

Why may Memory be termed Reproductive Imagination?

Consider the following:

Constructive Imagination is the process by which we recall past ideas and form them into new combinations unlike any which have ever come within our experience.

Show that the elements of Constructive Imagination are derived from Perception and Memory.

Show that Constructive Imagination depends upon Memory for its content but not for its form.

Show how this is illustrated by "Gulliver's Travels," or "Alice in Wonderland," or by the poetic fancy of trees possessing the power of speech. The author of "Flat Land" has described a species of beings possessing but two dimensions in space, and other intelligences possessing bodies of four dimensions. Can you imagine space containing four dimensions?

Examine the distinction between what may be called Passive Imagination (such as reverie or day-dreaming) in which there is little or no mental supervision, and Active Imagination (as in artistic or scientific work), in which there is conscious choice in the selection of the material, and of the form in which it is reconstructed.

Show that Passive Imagination has no conscious end in view, but that in Active Imagination there is an end or aim which determines the choice of both the content and the form of construction. Which is the more imaginative occupation, making an original painting, or sawing wood? Why?

In general, what is the end in view, (a) In artistic production? (b) In scientific work?

Experiments:

1. Draw a picture of some scene with which you were well acquainted in childhood.
2. Draw a representation of a landscape which you have never seen, but of which you have a written description.
3. Construct a picture purely from imagination.
4. Try to recall the elements of this picture from your past experience.
5. Make a drawing of an animal which, so far as you know, never existed. Does your originality in this exercise extend to more than the mere combination of the different parts?
6. Draw a picture of a fairy, bogey, dryad, nymph or mermaid. Whence did you derive the conception you have thus individualized?
7. Analyze your favorite day-dream or air-castle. Did anyone else ever imagine anything just like it? Where did you find the material for your reconstruction?
8. Write an essay embodying your ideal of a perfect character, intellectual, emotional, religious, etc. Consider which of these characteristics have been furnished by any of your friends, or by biography, or by the fictitious personages of literature. How is your own character affected by the contemplation of such an ideal?
9. Describe an ideal state of Society, after the manner of Moore's *Utopia*, or Bellamy's *Looking Backward*. Do you agree perfectly with any such description you have ever read?

II.—ANALYSIS OF AN ACT OF IMAGINATION:

Give a definite example of Active Constructive Imagination in your own experience and describe the various steps in the process. For example, suppose you have imagined the appearance of a glacier. Show that in all such cases, roughly speaking, there is 1st, an end to be attained. 2nd. The calling up of past experiences. 3rd. The breaking up of the reproduced images and the selection of the parts required. 4th. The combination and adjustment of these to the required form. 5th. The conception of the constructed image.

III.—RELATION OF IMAGINATION TO MENTAL DEVELOPMENT:

Consider the way in which Imagination enters into the gaining of knowledge.

In the perception of a cylinder, what sensuous data does a child receive on looking at it. To what extent does the Imagination act in forming the perception of the cylinder? Is the quality of hardness that we attribute to the cylinder due to Memory or to Imagination or to both? If a child has a candy box that looks like a cylinder, what associations will the Imagination be likely to make?

Show that in all such examples the mind supplies the setting or background and that thus, through the Imagination, the individual product formed by one person differs from that formed by another.

Show that the starting point in every lesson must always be a complex mental whole, an image colored by each individual's experience, interests, desires.

A child is familiar with the appearance of streams and ponds. He has never seen a river or a lake, but has been

taught the definition of a river. Describe the method you would adopt to teach him the definition of a lake?

How would you utilize his past knowledge of pond and river?

To what extent would his definition be a product of Sense-perception, of Memory and of Imagination? Could he learn the definition without Imagination? How would you deal with the answer from a pupil that "A lake is a wide, slow river"? What characteristics of a pond would you wish remembered for the construction of the definition of a lake?

Which affects the mental life more—that which is really perceived or that which is imagined?

Discuss the statement: "If teachers spent less time on Sense-perception and Memory, and more on seeing that the children form correct images, it would be better." Discuss the educational value of having pupils consciously construct imaginary scenes and describe the images thus formed. In what ways may the Imagination be overtrained? Show that Sense-perception, Memory and Imagination are successive stages in mental development.

IV.—CHARACTERISTICS OF A WELL-DEVELOPED IMAGINATION:

Point out characteristics of a well-developed Imagination. Does the habit of imagining only those things which are agreeable, render one unfit for the practical duties of life?

V.—TRAINING OF IMAGINATION:

Why is it difficult to train the Imagination directly?

The Lake Region in England is one of the most beautiful in the world. How may this have affected the poets of the so-called "Lake School"?

Give other examples to show that the physical features of a country may influence national character. How have they affected the Scottish character? How may the sublime as suggested by the presence of mountains or ocean affect individual character through the Imagination?

Examine how the Imagination may be trained indirectly: (1) By the presentation of suitable material. (2) By the cultivation of the feelings expressed in the products of Imagination, and (3) By the study of the modes of such emotional expressions.

In what ways may the Imagination be trained by each of the following:

- (a) The study of Literature, History, Geography, Inductive and Deductive Science;
- (b) Beautiful natural scenery and works of art;
- (c) The culture of religious emotions;
- (d) Spontaneous expression through motor activity by modelling, painting, language, etc.;
- (e) The formation and realization of ideals;
- (f) Companionships and social relations?

VI.—EDUCATIONAL APPLICATION:

Give illustrations of school-room applications and violations of each of the following:

Imagination depends upon Sense-perception and Memory.

It is free in its activity.

It is essentially individual in its character.

It is necessary for all development.

Intellectual, Emotional and Volitional Activities always proceed from sensuous to ideal and, therefore, involve Imagination.

In every act of learning, feeling or choice, there is an imagining process connecting the Individual with the Universal,

and without this there can be no proper assimilation of knowledge, appreciation of beauty, or development of character.

The construction of Images and Ideals is the constant work of the mind. There must be material for Imagination to feed upon in such construction, and the teacher can aid in the selection of proper material.

In a correct method of Education, the Imagination is trained indirectly.

The Imagination may be developed by placing the pupil under conditions where beautiful natural scenes and choice works of art will constantly appeal to him.

Such presentation may be accompanied by opportunities for individual imaginative and sensory-motor expression, *e.g.*, in early years, inventive activities—stick laying, block building, clay modelling, painting, written descriptions, singing, playing, etc.

Bible stories, fairy tales, biography (properly selected and repeated) in early child life, and in later years, History, Geography and choice Literature, furnish excellent content for Imagination culture.

Such presentation of materials for stimulating and directing the Imagination may go hand in hand with imitative and creative imagination on the part of the pupil in language, story telling, composition, etc.

In History and Geography the characters and places studied may become real to the pupil through active imagination, and the conceptions formed may be expressed by picture, model, language, dramatization, etc.

In Mathematics pupils may objectify the number and form relations dealt with and compose problems on their own account. In Geometry the figures of propositions may be imagined and the proofs worked out.

In Elementary Nature Study the subject may be treated from the imaginative rather than from the mechanical laboratory standpoint.

In later years, the student of Natural Science should not rest content with laws established, but should proceed to construct new hypotheses by his creative imagination and keep these in the foreground of consciousness for verification.

Imagination should not be limited to the present or the past, it should extend to the future.

It should not be confined to the wants of the self, but should project itself for the good of others.

The imagination may be cultivated by the formation of high ideals of life and character.

The personal influence of the teacher in the formation of such ideals is very great.

The imagination may be over-developed.

CHAPTER IX

Thought

I.—ANALYSIS OF THE THOUGHT PROCESS:

In the study of our life experience we find that if (by a process of abstraction) we cross-section the process at any given point, we have a concrete situation composed of definite factors. There is on the one hand the self-active individual, with definite desires, purposes, habits, etc.; and, on the other hand, the environment from which sensation stimuli are constantly received.

If we examine three successive cross-sections of consciousness, we find that the second grew out of the first, and the third out of the second, and that no conscious experience can be properly understood except in connection with the experience from which it has emerged and the experience towards which it tends. We also find that while there is constant change, there is a unity which persists throughout the entire life history.

Further, the change seems to be functional in character. There is a constant break-down and rebuilding. Attention is focussed upon those elements of the presentation in consciousness which seem to demand reconstruction. The presentation is interpreted in the light of past experience, and hidden relations are recognized. There is constant discrimination and association, some elements being discarded, others selected and unified. At times, especially in the early stages, this analytic-synthetic process is largely implicit and uncontrolled. In Sense-perception, Memory and Imagination, the activity may be comparatively superficial and restricted.

In the higher phase, called Thought, the aim or purpose is explicit, and the reconstruction is brought about through the conscious recognition of hidden relations.

Illustrate the foregoing statement by the thought process which leads to the conclusion that in the expansion of $(x+a)^n$ the numerical coefficient of the second term is n .

A.—Conception.—A child is asked to go into a dark room and bring a book from the table. There is but one book on the table, but there are a number of similar objects—an album, a box, etc. Describe in a general way the probable conscious experience the child will have in selecting the book. If his fear of the dark is stronger than his desire to get the book, will he make the selection? Through what sense avenue must he gain a basis for his selection of the book? In what ways will past experience assist him in interpreting the touch sensations which he receives from the book? What previous experience will enable him to discriminate the book from other objects? If the book was presented to him yesterday, and the gift was then carefully examined by him, and to-day he is asked to go into the room and bring from the table the gift which he received yesterday, will he be able to select it, even though he has never heard the word "book" or seen any other book? Why can he do this? On what basis is his selection made? If he has never perceived the book which is on the table, what previous experience must he have had to enable him without assistance to obey the command: "Fetch the book from the table"? Could he do so if he were not quite certain whether or not an album is a book? Could he do so if he had never perceived any other book? If you conclude that without having previously perceived a book he could be taught the definition of a book so thoroughly that he could make the selection, explain how, in such a case, the definition learned would still be based upon sensuous experiences of objects.

Give illustrations of the statement: "The value of a sensation depends not so much upon what it is, as upon what it stands for." On page 104 we found that the mind naturally looks beyond the thing itself to some hidden relations which are interpreted upon the basis of past experience and present desires. Give examples to show that this tendency to attribute meanings to things, begins very early in life. Show that the adult interpretation of experience is much more far-reaching and profound than that of the little child.

Compare the meaning of the terms, "this book" and "a book," in the following sentences:

(a) "This book which I hold in my hand has a red cover."

(b) "This is a book."

Examine the notion which lies back of the words in each sentence.

How many books are referred to in sentence (a)? Does the book referred to in sentence (a) possess definite size (say a length of six inches), and form and color? Could it be photographed? Could you receive sensations from it? Is there a definite external object to which the book in sentence (a) refers?

In sentence (b) do we, by the word book, refer to some particular book and no other, some particular object existing in space, of a definite form, size and color, etc.? To how many different objects could the word book in sentence (b) be applied if we chose to apply it to definite objects?

Let us now examine the content of consciousness in each case. If we remember the book referred to in sentence (a), how does this represented idea differ from that of book in sentence (b)?

Is our remembered idea a mental image which we could express by a picture of definite size, form and color?

Is our notion of book in sentence (b) a mental image?

Does the word book in sentence (b) mean more to us than the word "liber" would, if we had never studied Latin?

We find that the word book, as used in sentence (b), does not mean a universal book existing somewhere in space or a mental image of a universal book, and yet that there is a meaning quite different from the simple form of the word book, as composed of four letters.

We are said to have a Percept of book, represented by the words "this book," in sentence (a), and a Concept of book, represented by the word "book," in sentence (b), a particular or individual notion or concept of book in sentence (a), and a general or universal notion or concept of book in sentence (b).

Give examples of particular and of general notions.

Consider the way in which the general notion of book is developed.

Why does the child gain general concepts and learn new words? Would he ever do so if it were not for a desire to distinguish between things which he meets in experience?

A little child sees a book for the first time. Describe the process by which he gains a percept of it?

In what ways will his notion of this particular book be affected by his past experience? Has he, on the occasion of examining this first example, a general notion of book? If you then ask him to tell you what a book is like, upon what experience will his description be based?

To take a different example: Would a boy who had seen but one elephant, and had been told that it was an elephant, naturally conclude that there was a class of animals called elephants? Could he understand the meaning of the statement, "This is an elephant," if he did not think of a class? Would he conclude that all other elephants were just like this one? In what respects might he conclude they would be alike?

Similarly, does a boy who has seen but one book, begin at once, vaguely and perhaps unconsciously, to frame a defini-

tion of book? Suppose now that he is shown a second book. The first book was red, one inch thick, and covered with pasteboard. The second book is black, four inches thick, and covered with leather. How many percepts of books has he had? How do these percepts differ? What name do you give the act which he is performing when he places the books side by side and examines them to discover resemblances and differences? Compare two objects which you now see and make a list of common characteristics which they possess, and another list of differences. Compare similarly two remembered objects. Compare, also, a remembered object with one now present.

Can you think of a red color and not at the same time think of an object which possesses a red color? Can an object possess color and no other quality? Can you think of the color of an object without paying special attention to its form or size?

When the mind seizes upon one aspect of an object presented to it (for instance the color of an object) and thinks it apart from the other qualities, the mind is said to *abstract* it. Show that in the comparison of objects there is a constant process of abstraction going on.

After examining the two books, how many individual notions of books does the child have? How many general or class notions of book has he? How has his general notion changed as the result of seeing the second book?

He now examines the third book and finds that it is of a green color, that it is larger than either of the other books, that it contains pictures on some pages and print on others, etc. How many individual notions of books has he now? How has his general notion of book changed as the result of a third experience? Are there any two books exactly alike? Will his general concept of book change with each new book he sees? Give examples.

Will there be any common characteristic that persists throughout these changes?

Name common characteristics that he could find in all books.

Must a book have a cover and contain more than two leaves? Must the leaves be stitched together? Must a book be made for the purpose of being written upon?

Do all people agree in regard to the qualities which are essential to every book? Why not? What is the final authority?

How does the number of common qualities in fifty books compare with the number in two books? As the number of common characteristics decreases, does the universal notion become impoverished? Why not? As the number of common qualities decreases, does the number of individuals in the class increase?

Show by other examples that the further the investigation is continued, the more definite and wide-reaching does the general notion become.

In this process of comparison, what name is given to the act by which we find a quality (for example, that of having leaves) is common to a large number of individual books?

Give other examples of generalization. What name do we give to the act by which we group together under one head a large number of individuals possessing common qualities? Give examples of classification. Could we have a knowledge of a class of objects so as to be able to state the essential characteristics of any individual in the class and yet not have a name for the class? Mutes who have learned language late in life, find that their recollection of mental action during their early years is of a most elementary and indefinite character. Why is this? What advantages do we gain by giving a name to a class? Show how names enable us to classify new objects more readily than we could without them. Show

how language is not only the vehicle of thought, but also the instrument without which any process of thought (worthy of the name) would be rendered impossible.

Write a definition of book. What relation does this definition bear to your general notion of book? Show that in developing your general notion you have been gaining power to write a definition.

What kind of qualities does the mind specially emphasize in seeking for common characteristics while forming general notions? Does it seek for constructive principles, *e.g.*, the reason why books are made, etc.? Direct the attention upon a word with a view to considering its meaning and note how the mind acts. For example, consider the meaning of the word "home," in the sentence, "There is no place like home." Do you find the mind forming a mental image of a particular house, etc.? Could you understand the meaning of a word signifying a general notion if you were not able to imagine the corresponding individual correctly? Have you sometimes, while thinking and objectifying words in this way, had an incorrect image arise in consciousness which, on second thought, you discarded? For example, in considering the statement: "Similar triangles are to each other in the duplicate ratio of their homologous sides," a student who had at first learned to consider a plane triangle as three lines and not as a plane figure, might imagine his first incorrect conception and subsequently correct it by his revised conception.

We find that the Universal Notion is not a physical object or a mental image or a name. What, then, can be affirmed concerning it?

Consider the following and illustrate by examples:

A general notion can be expressed by a definition.

It can be understood only by a consideration of a particular or individual example.

It results from an effort of the mind to distinguish, to find

the hidden relations, the constructive principle, the ideal significance, the genesis of things. It furnishes the basis for the construction of mental images in future thinking.

Every individual notion is accompanied by a universal or general notion, they are simply two factors or phases of the same activity. One cannot be emphasized without enriching the other.

Words aid us in remembering and applying our general notions.

Give suggestions regarding the teaching of definitions and rules.

B.—Judgment.—Examine the following:

- (a) This yarn is red.
- (b) This is a book.
- (c) Air is compressible.
- (d) This flower is a *Ranunculus*.
- (e) Four times two is eight.
- (f) Man is mortal.
- (g) Virtue is her own reward.
- (h) God is love.

Each of the foregoing statements is called a Proposition. The word "is" is called the Copula, the part preceding the copula is termed the Subject, and the part which succeeds the copula the Predicate. The mental activity represented by each proposition is called a Judgment.

Describe a situation in which a person would naturally make the judgment: "This yarn is red." What purpose might he have in view in making this judgment? In what way might such an act be of value? In what way might it assist in future thinking? What is really done when the judgment is made?

Examine the remaining judgments in a similar way. Show that in each case two concepts are brought together.

How does the mental process in the judgment: "This is not a book," differ from that in the judgment: "This is a book"? In the negative judgment is there an effort to bring the concepts together and a final severance of concepts?

The judgments thus far considered are called Categorical, as compared with Hypothetical judgments which express one thing as conditional upon another.

In the hypothetical judgment: "If the snow is deep, many will go snowshoeing," how does the mental act differ from that in the judgment: "This is a book"?

In the judgment: "This is a book," do the subject and predicate mean exactly the same thing? If so, what is gained by making the judgment?

On the other hand, if the subject does not mean the same as the predicate, is the judgment untrue? Suppose we have a situation in which, after reflection, we arrive at the judgment: "This is a book." At the time of beginning the act of judgment, are the subject and predicate clearly defined in consciousness? Do we at first have a vague and undifferentiated presentation of sensations, images, etc.? What do we call the process by which certain factors are brought prominently into consciousness?

Consider the following: In an act of attention, there is always a basis for selection. In the mental process which results in the judgment, "This is a book," there is some reason why we direct attention to this object, which we subsequently classify as a book. There is also some reason for the inference that probably the object is a book. We have then, on the one hand, a certain sensuous presentation represented by the subject; that is, the subject is that point in sensation to which thought is to be directed. It furnishes and gives rise to the problem. It represents that part of experience which demands reconstruction. On the other hand, we have an idea (the universal notion of a book) repre-

sented by the predicate. Thus the predicate is a former habit used in present reconstruction. Both the subject and predicate belong to what is thought about. The copula is the tension in the experience between the forming stimulus and the forming response. The proposition, "This is a book," is therefore simply a statement of the result reached by the judgment—a result which enables us to advance to a new experience.

Compare the process by which, in practical, everyday life, one makes such a judgment as "This is a book," with the judgment of the scientist in the identification of a rare specimen.

What points should be observed in making a judgment? Show that judgment is involved in conception.

C.—Reasoning.—

(a) *Induction*.—Examine the way in which a person who had never heard of the Law of Gravitation, might experimentally discover the law. What must he do first? How many experiments should he perform? He holds a body in his hand, removes his hand and the body falls. He repeats the experiment with another body. The second body falls, etc. After a large number of such experiments, what conclusion does he reach regarding the probable behavior of any body when its support is removed?

The process by which we discover a general law by examining one or more individual cases is called Induction. Give other examples of Induction. Could we arrive at such a conclusion without comparison? Is it similarity or difference that we note in all the cases examined?

Can we notice a common characteristic if we do not at the same time notice differences? How does Induction resemble Conception, and how does it involve Judgment?

When we examine an object or observe an experiment until the vague whole becomes differentiated into clearly defined elements of which the mind seizes upon one or more, the process is said to be analytic. Show that Induction is analytic. In what ways can we aid in establishing correct conclusions by ordinary or experimental Induction? For example, in proving Boyle's or Mariotte's Law, that, "If the temperature is kept constant, the volume of the given mass of gas varies inversely as the pressure to which it is subjected," what steps should be taken? To find the change of bulk in oxygen gas when converted into ozone by the electric spark, Dr. Andrews repeated the experiment one hundred times. What is gained by such a method? Give examples of too hasty Induction. Supplement the list of suggestions regarding scientific experiments, p. 18.

Could the law of gravitation be discovered from one experiment? If we had sufficient insight to discover the law, would the process still be analytic? Suppose, for example, that a person notices but one object fall when unsupported. Name other qualities which the object might possess in addition to that of a tendency to fall to the ground.

Show that one experiment carefully performed and thoroughly understood may be more satisfactory than a large number of superficial experiments.

(b) *Deduction*.—Note how the law of gravitation (that all unsupported bodies tend to fall) is applied to particular cases by a person who is familiar with the law. What answer will such an one give to the question: "If I take away the support from this apple, what change will take place"?

Write three statements, the last of which is: "Therefore this apple will fall to the ground."

Consider the following:

All Frenchmen are Europeans.

All Parisians are Frenchmen.

Therefore all Parisians are Europeans.

How many judgments are there?

How many different classes are spoken of?

What class is most numerous? What class least numerous?

Why may Europeans be called the Major term?

Why may Parisians be called the Minor term?

Why may Frenchmen be called the Middle term? Represent the terms by three circles and illustrate the validity of the argument.

When we place a particular in a class, that is, bring it under a known law, we are said to reason by Deduction. A Deduction can be arranged in three judgments which, taken together, form a syllogism. In a syllogism there are always three terms, called the Major, Minor and Middle terms. The first statement is called the major premise, the second the minor premise, and the third the conclusion.

Complete the following syllogisms and select terms, premises and conclusion.

Where letters are used, give corresponding practical examples.

Endeavor to reach correct conclusions without any objective aids. When in doubt, verify results graphically, with circles, etc.

All men are mortal.

All of B is contained in C.

John Brown is a man.

All of A is contained in B.

None of B is contained in C. All of B is contained in C.

All of A is contained in B. Some of A is contained in B.

No C is B.

All C is B.

No C is B.

All A is B.

No A is B.

Some A is B.

Arrange the three terms, A, B, C, in as many different syllogisms as possible.

Incorrect Deductions.—Point out the errors in the following:

Mathematical studies improve the reasoning powers.

Logic is not a mathematical study.

Therefore Logic does not improve the reasoning powers.

Nothing is better than Wisdom.

Dry bread is better than nothing.

Therefore dry bread is better than Wisdom.

Matter occupies space.

Air occupies space.

Therefore air is matter.

Give examples of incorrect conclusions owing to:

(a) Incorrect Major premise.

(b) Incorrect Minor premise.

(c) Incorrect reasoning.

(d) Double meaning of terms employed.

Why may it be said that the most difficult point in deductive reasoning is to make sure of our premises?

Show by examples that:

1. False premises and correct reasoning may lead to true conclusions.
2. True premises and incorrect reasoning may lead to true conclusions.
3. True premises and incorrect reasoning may lead to false conclusions.
4. False premises and correct reasoning may lead to false conclusions.

5. False premises and incorrect reasoning may lead to true conclusions.
6. False premises and incorrect reasoning may lead to false conclusions.
7. True premises and correct reasoning must lead to true conclusions.

D.—Definition of Thought.—Conception, Judgment and Reason are all included under the term Thought.

What do we find in these that we do not find in Perception, Memory or Imagination. Show that Thought consciously deals with free universal relations.

Consider the following:

“In perception and imagination the laws of association hold the apperceiving power down to a mechanical reconstruction of the data of presentation. In reasoning the energy of apperception transcends these bonds and, proceeding upon the data of representation, realizes itself in its own way, according to its own laws. It is conscious and voluntary. Thought, therefore, looked at from the subjective side, is the reapperception of the apperceptive product in an active, conscious way, and from the objective side it is the development of mind in its essential nature as the organ of the realization of truth.”

“Thinking may be defined as knowledge of universal elements; that is, of ideas as such, or of relations.”

II.—DYNAMIC CONCEPTION OF THE THOUGHT PROCESS:

Explain and illustrate the following:

Thought never arises unless there is necessity for the reconstruction of experience—something which requires to be thought about in order to attain the purpose we have in view.

The present situation emerges from the preceding and quickly changes to the following under the analytic-synthetic process.

Induction and Deduction are simply higher forms of the analytic and synthetic activities, and differ from them only in dealing with explicit or recognized universal relations. These defining and relating processes go hand in hand, and the activity may be viewed from either standpoint. The discriminating view is analytic, the identifying view, synthetic. Thus there is a constant analytic-synthetic activity. In the Inductive Sciences the emphasis is on the Inductive or analytic side, in first discriminating in order to obtain a view of the common quality and thus discover hypotheses. In Deduction the emphasis is on the establishing of a relation between the universal and the particular, and thus develop proof. In so far, therefore, as in a process of reasoning, the attitude is one of search or discovery, the process may be said to be Inductive. In so far as it is an attitude of proof, it is Deductive. Show that all reasoning is both Inductive and Deductive at the same time.

Perception, Memory, Imagination, Thought, have no existence apart from what is perceived, remembered, imagined, thought. They are names given to successive stages in the development of knowledge as the mind proceeds step by step to establish wider relations, until in the thought process (the crowning activity of knowledge gaining) it consciously deals with universal relations only.

There is no such thing as a universal idea or law apart from the particulars to which the idea or law refers. The individual complex view always possesses two factors, the Particular (furnished by the presentation) and the Universal (furnished by the mind). The sensation is not known until the mind works upon it, casting it into its own moulds. On the other hand, there can be no knowledge without a basis in sense presentation.

The content or filling is from without, or from the objective side; the form is furnished by the mind itself.

In the words of Kant: "Intuitions without Concepts are blind. Concepts without Intuitions are empty."

By way of illustration, let us consider the reaction of the attentive mind from whole to part, and from part to whole, at different points or stages of knowledge development.

A child sees an orange for the first time and says: "See the yellow apple."

As the child looks at the orange, what sensation does he receive?

If he had had no previous experience, would this color presentation have been developed into knowledge? Note the way in which the individual factor furnished by his own mind acts upon this presentation in apperception.

Consider, first, the way in which he proceeds from the vague whole of sensation (and other complex elements) to his perception of the orange as an object existing in space. How do analysis and synthesis enter into this act of sense-perception? Would it seem spherical to him if he had not previously seen a spherical object and in a vague way formed a notion of the essential characteristics of a spherical object? Write a syllogism to describe a process of reasoning by which he might have arrived at the conclusion: "This is a spherical object." Is he *certain* that the object is spherical? Might he make the mistake of thinking that a flat surface was spherical? Show by examples that such conclusions in Perception are inferences or probable conclusions to be verified by use of other senses. What points of resemblance are there between a yellow apple and an orange? In what ways does the child who at first calls an orange a yellow apple, show more intelligence than if he had passively gazed at the object without formulating an opinion? Is he beginning to think? May he be said to know more than if he had not attempted to

classify the object? Will his knowledge of the apple be more perfect when he has properly classified it as an apple? Will his knowledge be increased by placing the apple under the law of gravitation? Show that in advance to larger wholes and wider relations the knowledge of the particular is constantly enriched.

Show that in reaching the conclusion, "This object is a yellow apple," the child, in a vague, unconscious way, has performed acts of Memory, Imagination, Comparison, Abstraction, Generalization, Reason?

Is it probable that he formed a mental image of some particular apple he had seen? What then did he remember? Was it his vague, universal concept of apple? Could we have language if we had not memory? In this case was the word apple recalled as the label or fringe of the sub-conscious universal concept? Would the judgment have been made if there had not been a native tendency in child mind to see everything with a universal background and to arrange into classes? What properties of the orange did he probably recognize as essential or casual properties of the apple concept? What characteristic differences did he note? Could he have placed the orange under the class apple if he had not in a sense imagined an object coming under the class apple, and yet different in color from any apple he had ever seen? Was the child conscious of the fact that he was remembering, imagining, comparing, abstracting, judging, etc.?

Compare the nature of Thought, (a) in the case of Sense-perception of the orange by the child with (b) that of the investigation of the law of gravitation, or (c) that of the comparison of the self-activity of the human mind with that of the Divine Mind.

III.—THE GROWTH OF KNOWLEDGE:

An infant three months old forms, for the first time, the eye hand co-ordination. Previous to this, if a red ball is held up before him and he wishes to grasp it, he is unable to find it with his hand. At about the hundredth day, his hand accidentally coming in contact with the object he is looking at, he receives a sensation stimulus from the ball through the eye and another through the hand, at the same time, and in a vague way becomes aware of the connection. He removes his hand and again, by a somewhat random but slightly controlled movement, brings his hand in contact with the ball, and for the second time notices the double stimuli. He continues such acts with great interest for a few days, until the habit is formed and he is able, automatically, to grasp any near object which he sees and desires.

Compare the activity of the infant in learning the eye hand co-ordination with that of a man seventy years of age who, for the first time, hears the statement: "Virtue is her own reward," and who, after careful deliberation, makes up his mind regarding the truth or falsity of the proverb.

Consider the following:

At every period of conscious life, from birth to old age, there is constant reconstruction of mind and body. On the Psychical side there is a constant growth of knowledge (power of interpretation-habit) and on the Physical side a constant change of nerve structure.

In the case of the infant acquiring the eye hand co-ordination, we know that in the brain, at the same time, there is a corresponding growth of the medullary sheath in the connecting nerve.

In the case of the activity performed by the man, we do not know what nerve change takes place, but we have reason to think that there is a corresponding change of some sort.

In conscious life activity there is always something to be attended to. In the case of the infant there is semi-conscious observation of sensation stimulus. The man, on the other hand, is receiving sensations, but he inhibits them and, for the time being, he consciously directs his attention to the discovery and proof of a law of conduct.

There is always an interpreting process going on, in which past experience comes into play.

The infant seems to know scarcely anything, and yet, during the three months his eye has learned to see with much greater power of interpretation than it had the day after birth.

In the case of the man, there is the experience of seventy years to draw from. The word "Virtue," which to the little child is meaningless, to him stands for a more or less extended series of experiences, through which he has gained a working knowledge of the word and can write a definition of it. In the solution of the problem he deals with universals, he calls to mind ethical laws, which, in the past, he has investigated and laid upon the shelf to use when difficult problems present themselves. The somewhat haphazard and implicit analytic-synthetic activity of attention of the child becomes, in the case of the man, a consciously explicit and deliberate search for truth, in which there is the scientific inductive-deductive activity of the *thought* process.

In both cases we have an enriched experience as the result of the activity. The infant is able to perform the new muscular co-ordination. The man has reached a decision—a law of procedure—which he can use in the interpretation of future life problems. He has passed from one concrete definite life situation to another, in which he has increased knowledge; and he has attained this added knowledge as a result of a reasoning process, in which he has used abstract universal instruments of interpretation, gained in former experience, in the solution of a new problem.

The process of learning in the best way combines both knowing and doing, both theory and practice.

The development of knowledge is from known to unknown, vague to definite, presentative to representative, concrete to abstract, sensuous to ideal, particular to universal.

The value of the universal is to serve as an instrument for future interpretation, and the definition or law has not been properly learned until it has been applied by the learner in the interpretation of new presentations.

IV.—METHOD OF A RECITATION:

Write plan of a first lesson, to teach how to find the area of a plane rectangular surface, giving selection and arrangement of subject matter and method of treatment.

Consider the following methods:

1. The teacher states the rule and asks pupils to memorize it, and to apply the rule in the solution of problems.
2. The teacher explains the rule and asks pupils to solve problems.
3. The teacher guides the pupils to the discovery of the rule and asks pupils to solve problems.

Point out merits and defects of each of these methods.

Show that, speaking generally, method 2 is superior to 1, and 3 is superior to 2.

In the treatment of such a lesson, five formal steps have been proposed:

1. *Preparation*.—A review of previous knowledge to be used during the lesson and a statement of the aim or purpose of the lesson.

2. *Presentation*.—The placing before the pupils of the subject matter which is to form the basis of their investigation.

3. *Comparison*.—The interpretation of the material presented.

4. *Generalization*.—The formulation and statement of the rule.

5. *Application*.—The application of the rule to the solution of new problems.

Point out advantages and disadvantages of such a treatment.

V.—EDUCATIONAL APPLICATION:

Give school-room applications and violations of the following:

Thought is the highest form of intellectual activity.

Thought training should receive the greatest consideration in education.

The student should form a habit of thinking those thoughts that are of the most worth.

He should form a habit of clear, accurate and logical thinking. At the same time he should be trained in the use of language as an instrument of thought and a medium of expression.

The particular and universal go hand in hand. In the simplest act of Sense-perception, Thought is implicitly involved.

In the proper training of Sense-perception, Memory and Imagination, there is an indirect training to think.

At each stage of development Thought training should receive more attention than in the preceding stage.

CHAPTER X

Sensibility

In what respects does a very emotional person differ from one who is not very emotional? Under the same conditions, which experiences the greater enjoyment, sorrow, pleasure, pain, sympathy, affection, etc.? Which has the more acute sensibility?

Give examples to show that in every activity of mind there is always a feeling or emotional side. The emotional aspect of every consciousness is usually spoken of as the Sensibility, as distinguished from the Knowledge or Intellect Aspect and the Self-activity or Will Aspect. What did we find to be the basis or raw material of Intellect? Examine the basis of Sensibility.

I.—INTEREST:

What do we mean when we say we are interested in anything? If something is naturally interesting to you, are you certain that it will be interesting to other people? Why is there no accounting for tastes?

A fruit, for example, a tomato, is examined by yourself and another person through as many senses as possible. You each get the same knowledge as to its form, size, color, weight, etc. Do you each experience the same feeling? Which depends more upon the individual sensation or interest? You say you enjoy the beauty of a rose, the taste of an orange, the tone of a musical instrument. You find it easy to attend to these, they are interesting to you. Is the *basis* of the interest in the *rose*, the *orange* or the *violin*? If it were entirely

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in the objects, would everyone be interested in them as you are? Is the basis of the interest entirely in yourself? Is it in a relation which exists between the thing and yourself? Give examples to show that interest depends upon a relation which exists between the thing observed and the observer. Can anyone else experience your interests? Is interest individual or universal? What is meant by saying interest can be felt but it cannot be described? What would a person's condition be if he had no interest in anything? The basis of all emotion is interest.

II.—NATURAL AND ACQUIRED INTERESTS:

Make a list of things you do not like. Select the names of those you have always liked, such are called natural interests. Those you have learned to like are acquired interests.

By what means can we acquire an interest in things naturally distasteful to us?

Speaking generally, natural interests may be said to be interests in things for their own sakes. Acquired interests are the feelings of attraction you have gained for certain objects through their association with others which are naturally desirable, *e.g.*, if a student has an ambition to become an inventor, he thereby acquires an interest in mathematical and physical science, an interest which these studies might not have the power of calling forth if they were not regarded as means to a desired end. In general, that is *naturally* interesting which directly affects us; that has an *acquired* interest which affects us indirectly. To which of these classes would belong objects which are immediately pleasurable or painful to us and objects which are employed for the attainment of future ends? Why may the interest in an end to be attained be called Direct, and the interest in the means to the attainment of such an end Indirect?

III.—PLEASURE AND PAIN:

In what way does pleasurable feeling differ from painful feeling? Show that in pleasure there is an appreciation of an activity suited to meet some end of our being, *i.e.*, that the activity tends to happiness.

Examine the feelings which accompany each of the following. State the general principle upon which the feeling is based and tell what change of condition would produce a different feeling and why? Deduce resulting educational principles:

A child is very hungry and is allowed to see food but not allowed to eat it. He is kept in darkness a number of days and not permitted to see the light. He is not allowed to taste, smell or touch objects. He is not permitted to receive information. Companionship of all kinds is removed. His surroundings are such as not to awaken conceptions of goodness or beauty. He is compelled to sit for a long time without moving a muscle. He is not permitted to talk, walk, or perform any other directive activity. He is constantly told not to do things but never told to do anything. He is compelled to dress and act differently from his companions. He is not allowed to play. He is given a closed box and told that he must not look in it. He has information which he knows others wish to know and which he wishes to impart, but he is compelled to keep it secret.

A child who is hungry for sensations of food, light, sound, touch, etc., is given these in very slight measure, a taste of food, a glimmer of light, a tickle of the skin, etc., or he is given them in excess; he is compelled to take food after his hunger is satisfied; he sees a glare of light, he hears a deafening sound, or his skin is rubbed to abrasion, etc. He is permitted to walk, but so slowly that it requires a fresh effort of the will for each step, or he is hurried along at his greatest

possible speed, or he is required to walk in the opposite direction from that in which he wishes to go. He is kept busy rolling the same stone up hill and down again. He attempts to row a boat up a stream against the current, and constantly finds himself drifting down stream. He finds that the reason he cannot accomplish his purpose is because he has selected a poor oar. A person has his arm broken. A child six years of age is drilled for half an hour on the answers to three or four such questions as how many tails has a cat, how many eyes has a cat, etc., or on such questions as to what genus does the cat belong? A person is kept at one steady round of work without change, and is never permitted to see strange scenes or strange faces. A person finds himself in a large city for the first time, where he knows no one. He is given work to do and the moment that he begins to acquire facility in its execution, he is changed to some unfamiliar labor.

A boy is compelled to continue playing marbles when the menagerie procession is passing by. The passengers on a vessel are informed that the vessel is rapidly sinking. A patriotic soldier seeing his country's flag displaced by that of the enemy. A person hears of the death of a dear friend.

IV.—DIFFERENT TYPES OF FEELINGS:

Sensuous and Ideal.—How does the feeling of pain from a burn on the finger differ from the pain occasioned by the death of a friend, or by remorse?

Give examples of sensuous feelings and ideal feelings. In which class of feelings, sensuous or ideal, do the emotions belong? Extend the following lists:

V.—FORMS OF EMOTION:

- (a) Self-emotions, pride, vanity, bashfulness.
- (b) Emotions which centre upon other persons or subjects: Admiration, love, patience, tenderness, fear.

Give instances of intellectual, æsthetic and ethical feeling.
What studies deal with these respectively?

Why do ideal objects (*e.g.*, fictitious personages, such as Dickens' Little Nell) as well as actual, arouse our emotions?

Compare the nature and intensity of the emotions experienced by (*a*) looking upon a beautiful landscape, (*b*) the memory of such a view, (*c*) the study of the artistic representation of it on canvas, (*d*) reading a poetic description of the landscape.

Compare as motives of action, (*a*) witnessing a brave deed with (*b*) reading a vivid description of it.

Give examples of feelings which you find to be pleasurable, unpleasurable, exciting, depressing, straining, relaxing.

What respective conditions of the pulse usually accompany such feelings?

Give definite examples where you have experienced pleasurable feelings as the result of:

(*a*) The acquisition of knowledge.

(*b*) The contemplation of beauty in an object, *e.g.*, the adaptation of its parts.

(*c*) Your relations with other persons.

VI.—RELATION OF EMOTIONS TO OTHER MENTAL PROCESSES:

Taking a few of the emotions (say fear, anger, joy, love, sympathy, hope), consider the effects of each.

1. On Intellectual processes (*e.g.*, anger paralyzes the reasoning powers—an angry man is proverbially irrational, sympathy incites to mental activity—with an equal effort the pupil can do better work who is in sympathy with the teacher).

2. On Volition (*e.g.*, fear decreases one's power to resolve and act—when greatly alarmed we

helplessly stand still instead of fleeing from the danger or resisting it).

3. On other emotions (*e.g.*, desire increases expectation, we look for three letters a day though we write but two, hope and fear influence belief, we confidently look for that which we long for, and on the other hand, the fear of an impending danger makes us believe it will surely come).
4. On the Physiological processes (*e.g.*, joy quickens respiration, sudden fear arrests circulation, prolonged sorrow permanently injures the whole organism). Make a list of emotions whose normal exercise is conducive to health, and another list of those which are detrimental.

Show that very intense emotional glow may interfere with Intellectual or Volitional activity when a moderate degree of feeling would be helpful.

Relativity of Feeling.—If a very loud sound is followed by a sound of slight intensity, what is the effect of the former on our judgment of the latter?

If a faint sound to which we have been listening for some time is followed by one which is very loud, how is the latter influenced? Similarly, after we have been suffering great pain, is a slight pain likely to be very disagreeable, (*e.g.*, is not the cessation of toothache an actual pleasure by contrast)? After a period of unusual enjoyment, what is apt to be our feeling toward ordinary circumstances to which we are usually indifferent? Why is our return to friends more pleasurable after a long absence than when we have been separated for only a day? Give other examples of the relativity of feeling.

VII.—THE GROWTH OF THE FEELINGS:

Consider the feelings which accompany the following activities in child life:

- (a) The taste of candy, the perfume of a rose, the sound of a bell, the sight of a brightly colored shawl, the gentle brushing of the hair, eating and drinking when hungry, sitting in a cold draft, grasping an object with the hand, lifting a heavy weight, having a tooth extracted, rocking in a rocking chair.
- (b) Looking in at the window of a candy store, the sight of a perfume bottle, the sound of church bells, the sight of a picture of the sea.

How do the feelings in (a) differ from those in (b)?

To what extent do previous experiences and future possibilities influence the feelings experienced in connection with each of the second list of sensations?

Is it true in every sensation, even such as those in (a), that the accompanying feeling is conditioned by natural temperament and also by previous experience?

The sight of an empty wine glass awakens a craving for drink in the case of a drunkard. Examine the process of development by which such feeling has grown from interest in the thing itself to interest in something associated with it.

Why may the feelings in (a) be said to be more ideal than those in (b)?

Wordsworth says of Peter Bell:

“A primrose by the river’s brim,
A yellow primrose was to him,
And it was nothing more.”

What impression does he wish to convey concerning Peter Bell?

From which of the following would a child four years of age probably derive the more pleasure:

- (a) The color of a red shawl, or Raphael’s picture of the Transfiguration?

(b) The rattle of a tin pan or one of Mozart's sonatas?

Does a child four years of age experience emotions of patriotism? How and when do such feelings arise?

Show that in the growth of feeling there is development, from sensuous to ideal, from vague to definite, from superficial to profound, from unrelated to related, from unconscious to conscious, from feelings concerning the present to feelings concerning the future, from feelings regarding self to feelings regarding others.

VIII.—RESULTS OF PAYING ATTENTION TO OUR FEELINGS:

What did we find to be the effect of attention to a sensation? What is its effect on the intensity of pleasure and pain? On the remembrance of pleasure and pain? Why can a child's crying be stopped by getting the child interested in something else? Why is it that wounded soldiers often do not know of their wounds until the battle is over? What is an invalid's best method of securing comparative freedom from pain? Why will anger and desire for revenge increase if we brood over an offered insult? Give other instances of the intensifying power of attention. What is the effect of *exercise* of the muscles on the strength, accuracy and quickness of movement? How does intellectual exercise permanently affect the ability to do intellectual work? Similarly show that the repeated *expression* of an emotion tends to strengthen the *feeling*. Will an angry man become more or less angry if he gives free expression to his feeling? What is the effect on character of always giving way to such a feeling? How are sympathy and affection influenced by giving expression to them through words or acts? Give other examples and find definite parallels in the physiological, intellectual and volitional fields. Consider in your own life the method of

growth of the feelings of rights, sympathy, reverence, faith, love, and of the conceptions of the good, the beautiful, the true, and of God, freedom and immortality.

IX.—CONDITIONS OF SENSUOUS PLEASURE AND PAIN:

A.—On the Sensory Side.—Illustrate the following by examples in the field of each of the senses, and point out the educational bearing of the respective statements:

1. A very intense stimulation is usually painful.
2. A moderate stimulus gives pleasure.
3. (1) and (2) have exceptions; for instance, some tastes, however slight, are always disagreeable, and others, no matter how intense, are uniformly pleasant.
4. The expenditure of stored-up energy, *e.g.*, the use of the eye, after a period of rest, is pleasurable.
5. A too long-continued use of the same sense organ becomes painful.
6. Frequent change of occupation is, therefore, conducive to the student's *happiness*.
7. Too frequent change may become painful.
8. Pleasure is usually the accompaniment of an activity suited to meet some end of our being, to contribute to some life-furthering process.

B.—On the Motor Side.—

1. Intense physical exertion is usually painful.
2. Moderate exertion is usually pleasurable.
3. Exceptions from these principles are usually the result from certain interests, *e.g.*, games requiring the most strenuous effort may yet be intensely pleasurable, and the performance of an un-

pleasant task which demands only a moderate amount of energy may be very distasteful.

4. The expenditure of stored-up muscular energy, *e.g.*, a brisk walk after several hours' study, gives pleasure.
5. Long continued physical exercise, resulting in fatigue, becomes painful.
6. Change in the kind of exercise one takes, conduces to pleasure and to physical well-being.
7. Rest after normal exercise is pleasurable.
8. There is a cadence or rhythm of movement which we find more agreeable than faster or slower movements.

Make a list of conditions likely to be attended with pleasurable interest, and another list with painful interest.

X.—EDUCATIONAL APPLICATION:

Give school-room illustrations of the following:

Every person is interested in something, and in certain things more than in others. Presentations are interesting in proportion to their power when interpreted to signify more than themselves.

What is interesting to one person may not be interesting to another.

There are certain things which seem to have a common interest for all persons.

Every activity (physical, mental, moral) has an interesting side, and activity is natural to every healthy person who is not fatigued.

Spontaneous activity is attended with pleasurable interest. Rest after exercise is enjoyable.

Expression is attended with interest, *e.g.*, in early years, speaking, reading, singing, writing, drawing, paper-folding, modelling, etc., are interesting.

The activity of the satisfaction of impulses to sensation, *e.g.*, hunger or touch, is interesting.

Imitation is interesting.

Play is naturally interesting, especially in early years.

Mental activity is naturally interesting.

Continued repetition of the familiar becomes monotonous. We are seldom interested in what is entirely unfamiliar to us or too difficult for us.

An activity which combines familiarity with novelty is interesting. The line which connects the known with the related unknown is the line of greatest interest.

When a number of different interests are presented the mind naturally attends to the most attractive.

Too many interests dissipate energy and divert attention.

We are naturally more interested in ourselves than we are in other people.

As we grow older, interest should extend to others, to family, friends, country, fellowmen, and God, otherwise self-love becomes deadening.

Where there is no natural interest, it can sometimes be acquired.

The habit of doing a thing may cause us to become interested in it.

An uninteresting subject may become interesting to us if we see it is interesting to those whose opinions we appreciate. It may become interesting by being associated with certain things with which we are interested.

It may be made interesting by a series of questions which awaken our curiosity regarding it.

It may become interesting as we investigate it further, owing to the attractive results obtained.

Attention should be given to a subject, not because it is at first attractive, but because it ought to be attended to, and if it be the proper subject for the learner, it then becomes interesting.

CHAPTER XI

Volition

The Will.—What is meant by saying that a person possesses strong will power?

I.—ANALYSIS OF A WILL ACT:

Consider the following:

A boy going to school in the morning is met by a companion, who urges him to play truant and go fishing. He considers for a time, weighs the matter in his mind, concludes that he will go to school, tells his companion he has concluded not to go with him and starts off for school.

What is the first requisite to any such act of choice? If neither the school idea nor the fishing idea seemed to present a state more desirable than that of remaining where he was, what would he have done?

“Poor, honest John Thompson, the hedger and ditcher, Although he was poor, didn’t want to be richer.”

Under these circumstances, would John Thompson make an effort to get richer? Why not? Give examples to show that in every act of will there must first be the conception of one or more possible states or conditions more desirable than the one which the individual is now in.

Make a list of the arguments which might incline the boy to conclude to go fishing. Make a list of arguments in favor of the school idea.

Make lists of disadvantages of fishing and of going to school.

Desire has been defined as "The conflict of an idea felt to be satisfactory with a reality which fails to satisfy."

Give examples to show that in every act of choice there is a conflict of desires and a deliberation or consideration of the respective values of these desires, before making a selection.

When the boy has made up his mind to go to school, are we sure that he will go? Why not? What is meant by the saying: "At night we make up our minds to leave our bed early, in the morning we make up our bodies to leave it late?"

What is meant by the saying: "The spirit is willing, but the flesh is weak?" What is lacking after making the choice, before the act of will is really completed? Will the choice be of any value unless an effort be made to realize it? An idea which has been selected in this way as the result of deliberation and choice, and which we set before us as an end to be realized, is called a "Motive." If we were unable to act, would we ever realize our motive? Give other examples of conflicting desires, deliberation, choice of motive and realization of motive. We found that Sensation is the basis of Knowledge and Interest of Feeling. Examine the basis of consciously directed Self-activity.

II.—IMPULSE:

Is there a natural tendency to activity in all individuals in early life? An infant is thrown into the water. In what way do its movements, mental or physical, differ from those of the expert swimmer under the same conditions?

A little child who has not learned to walk likes candy and knows the appearance of candy when he sees it. A piece of candy is offered him at a distance. The child looks at the candy, hesitates a moment, starts for the candy and tumbles on the floor. Why does he start for the candy? Describe what takes place in his mind. He contrasts the condition of

possessing the candy with his present condition; which does he select? When thus selected, what may this end be called? Why does he not realize his motive?

Does he *consciously* go through all these operations of choosing like the person who spends days, or perhaps years, in deciding what profession he will enter upon, or even like the boy who considers the question of truancy? When the little child is thrown into the water, does he decide upon a definite end before striking out? Of what is he conscious? If he were not conscious of a want, would he make any effort? Is this want vague or clearly defined? Which would be easier for the child, to move or to keep quiet when thrown into the water?

In each of the cases enumerated on p. 132, point out: (a) What want is uppermost in the child's mind? (b) In what way such mental activity may be said to be the basis of physical change?

What is the derivation of the word Impulse? What is meant, when we say a person is impulsive? Those mental activities which naturally impel us to physical action in order to satisfy such wants as the foregoing, without any special deliberation or choice on our part, are called Impulses.

Impulses which naturally, and *without training*, lead an individual to effect the change to which he is impelled in the proper way are called Instincts.

Show that impulse is the basis of Volition.

III.—CLASSIFICATION OF IMPULSES:

Impulses are usually classified according to the nature of the want which calls them forth.

Make a classification of Impulses. Give examples to show that there are naturally impulses to receive sensations, investigate, observe, acquire knowledge, imitate, mingle with

society and express one's self through muscular movement, play, language, gesture, constructive and industrial activities.

Show that these Impulses are bases of will activities.

If the little child had no natural impulse to activity, would he ever learn to walk? A child one year old and an adult each pluck flowers in a public park, the adult is punished for theft, the little child goes unpunished. Why is this discrimination made?

Are there certain times in life when certain impulses seem to be at their height? Why would it be unwise to attempt to teach a child six years old how to take care of a family?

At what periods in life do the following impulses seem to arise: Language, play, sympathy? Such times are sometimes spoken of as nascent or budding periods. If a pupil is not allowed to play in early childhood, how will this deprivation affect his later life?

In the order of motor development, which precedes, larger and more fundamental movements, or finer and more delicate and complex movements? Why should very young children not be required to do work demanding the exercise of the smaller muscles, *e.g.*, fine sewing, small writing, etc. If manual training be neglected during the nascent period of the motor centres, can the highest skill be afterwards attained? How does the nascent period of any activity affect the child's interest in such activity?

Test the maximum speed of movement in children of different ages by finding how many times each can tap with a pencil on paper (making dots which can be counted) in a given time, say ten seconds. Draw conclusions concerning the time required by pupils of different ages to do the same amount of work.

What is the effect of interference with the natural order of development of the impulses? Give examples of the results of arrested development. Show that arrested development

may arise from continuing too long upon the lower plane, or from advancing too quickly to the higher. Give definite examples.

What influence have pleasure and pain, respectively, on the amount of work one is able to do? Compare, with a dynamometer, or with spring scales, the maximum strength of your right hand when you are under pleasurable conditions (*e.g.*, looking at some object which gives you evident enjoyment) with the strength when you are suffering from slight pain. Give other experiments to show that pleasure increases and pain lessens available energy.

Make a list of desires which you have had. Point out ways in which desires are developed, and ways in which desires may be trained.

IV.—CONTROL:

We found that after the selection of a motive there must be action before the motive can be realized.

Give examples of activities demanding control of the senses and the muscles, and show how such physical control can be gained.

Give examples of activities demanding control for purposes of personal welfare. Show how such prudential control can be gained.

Give examples of activities demanding control, in order to conform to what we consider to be right. Show how such moral control can be gained.

Consider the way in which the will acts in learning to perform each of the following, and describe the process by which the learner advances from the first attempt and failure to the complete performance of the act: (a) Walking. (b) Talking. (c) Bicycle riding. (d) Carpentering. (e) Violin playing. (f) Solving geometrical problems. (g) Truth telling. Which

of these involves more physical, which more prudential, and which more moral control?

Show that in each case, before we begin to learn, there must be a contrast of desires and a choice of an end to be realized.

Compare the ways in which the habits of physical and moral control are formed. Point out resemblances and differences.

Show that there is first an effort to realize the end. Show that in acquiring physical control there is a regulation of impulses, an interpreting of sensations, a co-relation of movements and a repetition of activities.

Show that there are no new processes involved in Moral Control, but that the end becomes more remote, the desire more ideal, the deliberation more prolonged, the choice more difficult than in the lower forms of control.

In the examples of learning quoted (walking, etc.), what effect will the learning of the lower forms have upon ability to gain control in the higher? Why? Explain the statement, "The weaker the body, the more it commands the stronger, the more it obeys."

Show that every action, no matter of what kind, has a definite effect upon will power.

Show that an act in itself, not strictly moral, may become moral when performed under certain motives.

Is conscious exercise of the will the only cause of movement? Give instances of movements brought about by some internal pleasurable or painful condition of the organism, which is not the immediate result of external stimulus, *e.g.*, the spontaneous activity of very young children. These are usually called *Automatic*. Illustrate movements which result from some physical stimulus, but without the intervention of the will, *e.g.*, winking when some object is brought suddenly close to the eye. Such acts are called *Reflex*. Compare their

force in definite instances with that of voluntary acts; that is, do these reflexes ever or always take place, in spite of our willed resistance? Contrast with Automatic and Reflex acts those which follow deliberation and choice. In lower animals, which of these three forms of activity is most frequently met with? Why is man called *rational* in distinction from the lower animal? What effect on movement has the mere presence of a sensation, an emotion, or a choice? If every mental state *tends* to express itself in muscular movement, why does it not always *actually* express itself? How would you explain such cases as the sudden impulse to jump off high places, the unconscious swaying of the head of the observer in sympathy with the movements of a football player in whom he is interested?

Compare the force of a sensation with the amount of movement in response to it. Normally the degree of movement is roughly proportional to the intensity of the sensation. What conditions, physiological, volitional, etc., would interfere with this relation? In the emotional life, does greater expressiveness imply stronger feeling? Why not? In this respect, compare children with adults, the uneducated with the cultured classes, the strong-willed with the weak.

Does the physical expression of an intense sensation (*e.g.*, an agonizing pain) or of a violent emotion (say anger) ever get entirely beyond volitional control? Can a healthy will be trained to control the expression of the strongest feelings? Why do a boy's first efforts at writing usually result in more or less diffusive and convulsive movements of the whole body? What is the effect of the growth of inhibition on such movements?

To which of the following movements in man does voluntary control extend: Circulation, respiration, movement of limbs, of the ears, of facial muscles? Can volition originate a movement which it cannot afterwards control, or *vice versa*?

To what extent can the expression of the feelings be controlled, as in blushing, anger, fear, laughter?

In what way is the strength of a feeling affected by inhibiting the manifestation of the feeling? Can we directly determine what our thoughts shall be? To what extent is the intellectual life under the supervision of the will? How far does the voluntary direction of attention towards any subject determine the sequence of idea?

Have instinctive acts any definitely pictured end in view; that is, are they incited by conscious motives, *e.g.*, does the migrating bird consider the more favorable conditions of the country to which it is going, or is the migration merely the expression of a blind feeling which results from the relation between the bird's organism and its present climatic surroundings? In persons, is the desire for companionship the result of a consideration of the pleasure or advantage to be gained, or may it be entirely apart from these? Can you banish an instinctive fear, such as a dread of lightning, by considering how relatively harmless it is? If a child be afraid of the dark, why is it important that he should discuss the question with someone who will show him that such fear is groundless?

Compare instinctive with voluntary action, as to: (a) End in view. (b) Conscious control of means. (c) Directness of result. (d) Kinds of stimuli. (e) Uniformity of action. (f) Complexity of action. Consider the relative power of pleasures, pains, the impulse to imitation, the desire to please, the love of the beautiful, the desire for knowledge, and religious feelings, as motives to voluntary action.

Compare the strength of these motives:

(a) In child life and in adult life.

(b) In persons of different types of character.

Compare the relative strength of ideal and sensuous stimuli in persons of different age and character.

Make a list of different motives which are most prominent at different times in the child's life; *e.g.*, at what age is the impulse to imitation strongest?

V.—HABIT AND CHARACTER:

A little child has difficulty at first in learning to shake hands with the right hand. Why do grown-up people not require to stop to think what hand to use?

A person takes a friction bath every morning for ten years, does he require to make up his mind to do so each morning of the eleventh year? May he take a bath without consciously noticing that he takes it? Why is this? A person is strictly honest for twenty years, is it easy for him to be honest the twenty-first year?

Point out the result of habit in all activity.

If a boy who is tempted to play truant yields the first morning, and is similarly tempted to play the second morning, is he more likely to yield under similar temptation than on the previous occasion? Why is this? What is the result of choice in the formation of character?

Point out resemblances between retention, character, habit.

Show that choice resembles apperception and that character resembles retention.

What is the effect of an error on future performance of the same task? If we have added a column of figures from bottom to top, why do we verify it by adding from top to bottom? What is the effect of habit on the difficulty of performing an operation? Explain the meaning of the statement: "The perfection of art is to conceal art." In what way is the definiteness of an action influenced by habit? How do habitual compare with unusual acts in the degree of conscious supervision required? How does this effect of habit influence our power of doing more than one thing at a time? Why is that

virtue deepest which is unconscious of itself? If a habit is difficult to overcome in proportion to the number of times the act has been performed, and if instincts be inherited habits, how would they compare in this respect with ordinary habits formed within the lifetime of the individual? Make a list of the hereditary tendencies which you consider most marked in your own character. Which are admirable and which objectionable?

Discuss methods of eliminating the latter and encouraging the former. Make a list of the most important environing forces which have helped to mould your character—persons, books, artistic productions, natural scenery, etc.

Point out effects of heredity, environment and education upon character. Can an individual, by force of will power, rise superior to all these influences? In the case of a boy who is tempted to play truant, but knows that he ought to go to school, there are usually three courses open: First, to at once follow the call to duty, turn his back on the temptation and hurry off to school. Second, to deliberate and choose which course to pursue. Third, to at once yield to the temptation and hurry away with his companions. Which is the best method? Which is the easier for the average boy? Why is there more hope for the boy who chooses the second, than for the one who chooses the third. If he makes an effort to rivet his attention upon the advantages of going to school and the disadvantages of playing truant—why will the temptation tend to grow weaker?

Compare the following methods of learning to swim:

1st. The learner is repeatedly thrown into the water and allowed to struggle into a knowledge of how to swim. He is given no instructions whatever, but is rescued in case of danger.

2nd. The learner is taught all that can be learned about swimming without going into the water.

3rd. The learner investigates the subject carefully until

he knows what is the underlying principle of swimming, what form of action is best, what dangers are to be avoided, etc. He then goes into the water and, under the observation of a skilful trainer, is guided, encouraged, cautioned, until he learns to swim.

Point out the advantages and the disadvantages of each of these methods. Which is the best method, and why?

Give illustrations to show that in learning it is always well to combine knowing and doing.

VI.—EDUCATIONAL APPLICATION:

Give school-room applications and violations of the following:

All education should aim at the development of personality, will power, self-control, character.

Every action, no matter how trivial, if properly performed, strengthens the will, *e.g.*, the discrimination of sensations, the co-ordination of muscular movements, the memorizing of a literary selection, or the solution of a mathematical problem.

There are natural impulses which should be developed, and others which should be checked.

There are nascent or budding periods in child growth when certain impulses are at their height, and when development along these lines is much easier than if attempted earlier or later.

A will act involves the carrying out of a motive. A motive is first a desire, and, in order to have a desire, we must have an idea of some other condition which we consider preferable to our present condition.

Desires are furnished through interest in surroundings, imitation of others, external stimuli and psychical activity.

A desire must be considered to be attainable before it forms a basis for action.

The will is developed through control of movement. The development of control is from muscular to prudential, and from prudential to moral.

In learning, it is important to know what is to be done and how it is to be done, and to actually do the thing.

A good model for imitation enables the learner to save time by avoiding too much experimentation.

Initiative is the essence of a will act. The child should learn to deliberate and choose for himself, and persevere in the execution of his choice without too much assistance from the teacher.

The teacher can assist in surrounding the child with suitable materials for the development of high ideals, can furnish the best type of model, and to a certain extent, guide the child to a proper selection by leading him to see the true meaning of things.

The best way to secure good order in the class-room is to provide pupils with the proper amount of suitable work, under satisfactory conditions.

The individual can form a habit of placing himself under such surroundings as will suggest lofty ideals.

Through continued exercise and effort the learner gains power to inhibit useless impulses and concentrate attention upon the work in hand and upon the purpose to be achieved.

Social activities (*e.g.*, obedience to properly constituted authority, self-denial for the general good, co-operation with others) furnish the best field for moral training.

The highest type of conduct is that which results from conformity to the highest ideal, *viz.*, to do right because it is right, and therefore ought to be done.

Children should be given opportunity for deliberation and choice, but should not be placed under temptations demanding a greater effort of will power than they are capable of.

In case we are tempted to select as a motive a desire which

we know we ought not to select, the will is strengthened by fixing the attention upon the advantages of the worthy desire and the disadvantages of the degrading one until the better conquers and becomes a motive.

In most cases, however (as a result of forming a habit of choosing the higher motive in the past), we may have formed a character which enables us, without effort, to automatically select the highest without conscious deliberation. Where the temptation proves too strong for this, salvation consists not in yielding at once, but in deliberating until the higher desire triumphs.

The will is strengthened every time we realize a motive, no matter how low in the scale the activity may be.

The will can be trained to form a habit of proceeding at once to realize the motives we have set before us.

Habits of moral and religious control form character, and this is the highest object of all training.

CHAPTER XII

CHILD STUDY

I—ITS NATURE AND PURPOSE:

Educational thought in recent years has become increasingly conscious of the importance of understanding, as perfectly as possible, the nature of that being whom we are endeavoring to teach; and this in order that we may the more efficiently teach him. The man who purposes devoting himself to the work of training any of the lower animals, or even to the culture of plants, feels at the outset the necessity laid upon him, of studying animal nature, or plant nature, as the case may be, in order to the attainment of the highest success in his calling. Even the worker in the inorganic world, the builder of bridges, vessels, or houses, finds it absolutely necessary, not only to have a clear conception of the end at which he aims, but also to possess a thorough knowledge of the nature of the materials with which he works, and the effects produced upon those materials by climatic and other conditions. But those who are engaged in the supremely important work of teaching human beings have too frequently taken it for granted that they required no further knowledge of their pupils than that which had already come to them by virtue of incidental association with the children of the community. We are learning, however, that the qualifications of a thoroughly efficient teacher are many and varied. He should possess not only a clearly defined ideal (*i.e.*, a conception of the completely developed personality which is the goal of all his efforts) and a thorough knowledge of the subjects which it is his business to teach; he requires

also an intimate acquaintance with the nature and laws of development of that juvenile personality whom he is striving to educate in the direction of his ideal. And this is what we mean by Child Study, the nature and purpose of which may therefore be very briefly defined as the careful and systematic observation of child nature, for the sake of the most rational and effective methods of child training.

II—ITS SCOPE:

The above definition assumes that all Child Study is undertaken with a pedagogical end in view. Whether this be really the case or not, at any rate, for our present purpose, the pedagogical motive may be regarded as the dominant one. In the hands of an enthusiastic teacher, Child Study can hardly fail to become at once *applied* Child Study. Treating it then, from this point of view, as subservient to education, the question as to its scope may be answered by considering the scope of education. Many definitions of education have been given; but however we define the term, there are three points which no sound definition can omit. In the first place, education must take cognizance of the nature of the individual in its entirety; and secondly, it must adjust itself to the laws and conditions of *growth or development*, the constant unfolding of a never-resting psycho-physical organism; and thirdly, it must take into account the action and reaction of the individual and his surroundings. In that case Child Study will have reference to the entire concrete being of the individual child; and it will consider that complex being from every relevant point of view, including its relation to an infinitely diversified and constantly changing environment, and the relation of any given set of conditions to the causes by which they have been determined, and the consequences to which they lead. This means that Child Study is simply the effort

to know all that can be known about the actual child, at least all that can have any bearing upon the solution of the educator's problems. To indicate in some measure of detail what and how much this involves, as well as to suggest how best it may be done, is the purpose of the following pages.

To anticipate those pages in outline, we may say that Child Study includes, in the first place, an enquiry into certain circumstances and conditions more or less external to the individual himself, and yet exercising an important influence on his development, as, for example, ancestry, hereditary tendencies, pre-scholastic environment, and the like. It includes, in the second place, a thorough study of the child's personality, taking account of the physical conditions affecting that personality, as well as mental characteristics, temperament, disposition, predilections and preferences, emotional and volitional qualities; and these, always and everywhere, not as isolated phenomena, but as inseparably blended in the total concrete life and personality of the individual. It includes, in the third place, the history of this personality; the manner in which it develops in constant interaction with its environment; the significance of present reactions on that environment; and all ideas, hopes, expectations, ambitions and resolves, regarding the future. This is a large field, but there can be no doubt that every part of it has a bearing on the work of the educator.

III—ITS METHODS:

Before discussing in further detail the field outlined above, we may briefly consider the principal methods employed in the observation of childhood. These methods vary according to the circumstances, opportunities and purposes of the observer. The methods most commonly employed may be described with sufficient accuracy under four heads, as follows:

A.—The Individual Method.—If one has sufficient leisure and opportunity, nothing produces better results than the constant, daily observation of one and the same child, on all sides of his being, and from every point of view, throughout an extended period of time. Professor Preyer, Miss Shinn, and others, have in this way made daily study of a single individual during the first three years of his life, and embodied their results in exceedingly valuable volumes. In order to insure accuracy, observations should be recorded as soon as made, or as promptly as possible. Notice, for example, with what persistence a child of one year tries to get a key into a lock and open a drawer. Observe the facial contortions, and the useless muscular adjustments. Notice, also, the imperfect command of those muscular movements that are relevant to the matter in hand; the inaccurate judgments of distance, size, etc., by the eye; and write down at once your description of what you see. A very similar example from the school-room would be furnished by the pupil who is just learning to write. Observe all his movements, not only of the hands, but of the head, body, and lower limbs; and describe these movements as accurately as you can. For the teacher's purpose, observations of school-children are even more valuable than those of infants.

This method possesses the obvious advantage that it gives us something like an all-sided view of a complete personality, instead of partial views of a number of personalities. And this is an important matter, since every individual is, in spite of the complexity of his organization, nevertheless an *individual*; that is to say, every faculty and power of his being is intimately and vitally related to every other, and should be studied in that relation, and not independently. No single fact requires more emphasis than this, that every child in the world is a unique personality, possessing his own peculiarities and distinguishing characteristics; and if we would completely

understand any individual, we must study these characteristic qualities in their mutual relation. If, for example, a given individual is peculiarly pensive or melancholy in temperament, we may expect to find that this characteristic of his emotional life has left its mark upon his habits of thought and will, upon his desires and affections. To take account solely of his peculiarities of thought or will, without any reference to his emotional idiosyncrasies, even if such an abstraction were possible, would be to read him incompletely, and to that extent falsely. The human being is not an aggregate or bundle of loosely-related faculties; he is a single, living organism, and must be studied from that point of view.

B.—The Normal Method has been so called because it was first employed in schools where teachers were being professionally trained for their work; and because it is peculiarly adapted to their circumstances and opportunities. Teachers-in-training are encouraged to make memoranda of any facts that may come under their observation as they come into contact with children, at home, at school, or on the street. These memoranda are afterwards made the basis of lectures or discussions at the school; the most valuable points receive special emphasis, and in this way the young teacher is trained to be a careful and discriminating observer. The observations may be afterwards classified under appropriate headings and kept for future use.*

C.—The Statistical Method may be considered, in some respects, as the opposite of the individual method. Instead of seeking to discover many things about one child, the object now is to learn one thing about many children, by means of extended inquiries. These inquiries may be carried

*As has been done, for example, in the volume entitled *Child Observations; Imitation and Allied Activities*. Edited by Miss Ellen M. Haskell; with an Introduction by E. H. Russell. Boston, 1896.

on by means of printed syllabi. One topic is taken up at a time, say the feeling of the beautiful, and a limited number of printed questions is placed in the hands of a large number of persons, who are requested to send written answers to these questions, based either on memories of their own childhood, or observation of the children with whom they come into contact. These answers are then collated, and whatever general conclusions seem warranted, are put in published form. Dr. Stanley Hall has issued a large number of such syllabi, touching a great variety of topics. Some of the results of these studies may be found in the pages of the Pedagogical Seminary, and of the American Journal of Psychology. Professor Earl Barnes and others have obtained some valuable results from the study of children's compositions, written in the ordinary course of school work. Interesting light has been obtained in this way on the thoughts and reasonings of children regarding such topics as punishment, truth and falsehood, and the leading religious conceptions.

The principal advantage of this method is that it gives large general averages, gathered from observation of many children; and its results, therefore, while they may not be true in detail for any single child, are likely to represent more closely the average child than those obtained by the individual method. For it must be borne in mind that children differ widely from one another; probably no two in all the world being exactly alike; whence it follows that results obtained by the individual method with respect to one child, cannot be assumed to hold good, except in a broad, general way, for any other child, or for children in general. In short, these two methods, the individual and the statistical, supplement each other, the former revealing the individual peculiarities, the latter bringing to light that which is common, fundamental, racial.

D.—The Experimental Method.—The present age is an age of experiment, and of active interrogation of nature. The spirit of experimental inquiry has penetrated the sciences which have to do with human life; and we have biological and psychological laboratories of investigation. Apparatus has been devised by which the ability of a child to exercise prolonged control over certain muscles of his body may be definitely measured; as well as many other facts having an important relation to the work of the school-room.

Now which of these methods are available for the ordinary teacher in a Public School? None of them in any complete sense; yet all of them to a certain limited extent. The average teacher is far too busy to be able to make a thorough and exhaustive study of even one individual child, much less of all the children in his school; yet it is of such vast importance that he should know his pupils as fully as possible, in order to do his best work as a teacher, that we make bold to urge in the strongest way the employment of the Individual Method, in so far as is practicable, not only upon one child, but upon every child in the school. Moreover, the teacher who is really interested in his work, will be habitually alert to observe the workings of the child-mind wherever he may come into contact with it; he will therefore find opportunities of employing the Normal Method. Again, he will be able from time to time, so to utilize the school-room essay writing, as to reach deductions having a measure of generality, after the manner of the Statistical Method. And finally, he will certainly fail in his duty, if he does not at least assure himself with regard to the condition of the sense-organs of his pupils, so as to make special provision for those who are defective in sight or hearing, or in any of the other senses. This he will do by means of simple experimentation, as we shall explain further on.

IV.—ITS RESULTS:

It would not be possible here to give a full account of what has been already accomplished through Child Study; but we may record our belief that many parents and teachers have found their interest in childhood greatly stimulated by means of it; and that their efforts to teach and train have been made with a more definitely conceived purpose, in a more natural and, therefore, a more scientific way, and with better results. Already there is evidence of a clearer recognition of the general order of development, and, back of that, of the fundamental fact that all education has to do with living processes rather than with dead things. Greater attention is being paid to the psycho-physical relation, with all that it involves; and to the inseparable connection between assimilation and construction, or between receptivity and activity. That there is a natural order and a natural method of procedure in education is fully recognized, and the effort to find and follow that natural way promises to render pedagogic dislocation and arrested development less and less likely to occur as time goes on.

V.—HEREDITY AND PRE-SCHOLASTIC ENVIRONMENT:

Thus far we have discussed the nature, purpose, scope, methods, and results, of Child Study. Let us enter now into some further detail, in order to show as clearly as possible what the teacher should know about his pupils, why he should know it, and how he may best obtain this knowledge.

The present is the outcome of the past. But for the past, the present would not be what it is. This is true of nations, of communities, and of individuals. If my past life had not been what it was, my present life could not be what it is. In the same way the character of my future depends on that of

my present. This truth is commonplace enough, and yet truly startling when you consider what it involves. At the same time it furnishes a strong incentive to all sound education, as well as to all moral reform.

Two deductions follow at once from these facts. In the first place, it is of the highest importance that all the work of the teacher with his pupils should be of such a character as to conduce to the highest good of those pupils in the future as well as in the present. In the second place (and this is what we are concerned with at present) if the teacher is to do his best work with his pupil, he ought to know something of the past history of that pupil, since the past exerts so potent an influence upon the present and the future. Would it not be possible for the teacher, without being officious or meddling in any way, to acquaint himself somewhat with the pupil's ancestry and home surroundings? Sometimes there are strongly marked hereditary qualities, or qualities developed by home surroundings, with which the teacher ought to be acquainted, and which ought always to be taken into account in dealing with the child. One child inherits tendencies in the direction of a coarse, vulgar, and sensual life; another is the offspring of refined and cultured ancestors, who, perhaps, at the same time, having known nothing of hardship, were somewhat inclined to effeminacy or vanity. It would be greatly to the teacher's advantage to know these things. In the writer's own experience as a teacher, he came into contact with two cases which illustrate very well the influences of heredity and home environment on the pupil's character. The one girl not only inherited from dissipated ancestors a weak and excitable nervous organism, but was treated with great cruelty in her home; so much so, that she came to school expecting similar treatment at the hands of her teacher; and, withal, so thoroughly frightened in advance as to be quite unable, for a good while, to give a creditable account of her-

self in her classes. The other girl was the exact opposite of this in almost every particular. Inheriting from her ancestors a physical organism of the most robust and vigorous sort, with nerves of iron, she had still further developed that hardy frame by a life of continual activity in the open air. Having no sisters, and having lost her mother in infancy, she had grown up in the constant companionship of brothers still hardier and rougher than herself; until, at the age of twelve or thirteen, she was a fearless, boisterous hoyden, with more masculinity in her disposition than many of the boys in the school possessed. Was it not evident that these two pupils required entirely different treatment, and that a knowledge of all these facts which I have cited made it a hundredfold easier for the teacher to adapt his treatment to the requirements of these two cases? The facts were learned without recourse to any improper means; merely by becoming acquainted with the two families in the ordinary course of events, and carefully remembering what one saw and heard.

It is absolutely necessary, if good results are to be looked for, that the child's school education shall link itself on, at every possible point, to his pre-scholastic education in the home. For it must not be forgotten that every child, when he comes to us, is already partially educated, even though he does not know a single letter of the alphabet. He has already spent half-a-dozen years in close contact with nature and with human life, and has received a large store of ideas through his keen sense activity. He has laid the foundation of a multitude of habits. His powers of perception, representation, and action, have all been to some extent evoked, exercised, and developed; so that the teacher will make a serious mistake if he supposes himself to be dealing with a *tabula rasa*. The teacher's work is not to *begin* the education of the child, but to *continue* it; and his aim should therefore be, to make his part of the work really continuous with that which has

already been done, in so far as that has been true and good. And, in any case, school instruction of an intellectual sort must link itself to the pupil's previously acquired knowledge; otherwise the teacher's efforts must result in failure. And if this "linking on" is to take place, the teacher should know something of the home life and surroundings of the pupil. He can easily discover the social position and occupation of the child's parents; and in many cases it will not be difficult to find out what subjects are most discussed in the home, and with what subjects the child may be presumed to be most familiar. The child of a physician, for example, while he has many ideas in common with other children, will probably also possess a whole realm of ideas almost entirely foreign to them. Similarly with the child of a farmer, mechanic, sailor, or railroad engineer. Children born and reared in the city know a great deal more about some things, and a great deal less about others, than those brought up in the country. How differently must one proceed, in teaching a lesson on cows and sheep, when dealing with the children of farmers, and when dealing with children brought up in the heart of a great city, and having no other acquaintance with these animals than that obtained from picture books.*

There can be no doubt that great benefit would result from the cultivation of a closer acquaintance between the teacher and the parents of the children, and from frequent consultations with regard to the pupil's physical condition, mental progress, habits, tastes, preferences and dislikes. By this means some predominant interest of the child's life may be discovered, and turned to good account, not only in the school-room, but with reference to the entire life; or, perhaps, some fixed aversion, some good or bad habit, or some strong and striking trait of character, may be brought

*See President Stanley Hall's pamphlet *The Contents of Children's Minds on Entering School*.

to light, the knowledge of which might obviate many a pedagogic blunder, and secure many a disciplinary triumph.

VI.—THE CHILD'S PHYSICAL AND SENSORY ORGANISM:

One does not need to be a materialist in order to realize the importance of physical conditions in relation to education. Not only are the mental and moral bound up in the closest way with the physical, but the bodily organism itself is an essential part of that entire individuality, the highest perfection of which is the aim of education. When these truths are recognized, the importance of the child's body, in relation to his education, becomes at once apparent.

Enough has been said in the psychological part of our work, to set forth the manner in which physical processes enter into and condition the process of the acquisition of knowledge by way of the senses. It has been explained how, in seeing colors, hearing sounds, tasting, touching, smelling, and in all other sense activities, delicate sets of nerves are stimulated by movements in external nature, and this stimulation propagated to brain centres; whence follow ideas in consciousness. Now from this intimate relationship between sensation and nerve action two things follow: First, that if any given organ of sense, such as the eye or ear, is to perform its work well, the organ itself, and the nerves that belong especially to it, must be in a healthy condition; and secondly, that if the mind of the individual, as a whole, is to work at its best, his body as a whole, his entire physical system, should be in a state of the highest possible vigor and efficiency.

Will not the teacher do well, then, to give some careful attention to the physical well-being of his pupils? When a new pupil enters the school, would it not be well to make inquiry of his parents, as to his previous health, and his gen-

eral physical state at the time of enrolment? Is he delicate or robust? Has he always had a good appetite, or has his appetite been fitful and capricious? Does he sleep well and soundly, or does he talk in his sleep, or dream much? Can he endure much physical exertion, or much mental labor, or does he easily complain of fatigue? Has he ever had any serious illness; or any nervous disorder, such as St. Vitus' dance? Has he grown very fast, or slowly; and at the present time is he growing rapidly or slowly? Has he decayed teeth, adenoid growths in his nose, or catarrhal deafness? Can he see clearly, or is he near-sighted, or troubled with any other disorder of vision? Some of these questions may be answered by the teacher's own observation, some by consultation with the parents, while in the case of some it is not always safe to trust either of these sources of information by itself. In such cases it is often possible to determine the matter for oneself by exact experiment. For example, a slight defect of sight or hearing might be overlooked by the parents, and might escape the ordinary observation of the teacher; and yet might seriously handicap the child, if he occupied a seat in the farthest corner of the school-room. The teacher should be provided with a set of large cards, such as are used by oculists, having upon them plainly-printed letters of different sizes. He can then very easily determine whether the pupil's vision is normal by asking him to read these letters at a certain distance. In order to satisfy oneself as to the condition of both eyes, they should be tested separately. This can easily be done by bandaging one eye while testing the other. If a pupil is color-blind the teacher should be aware of the fact. That this abnormality is by no means rare, is shown by many experiments. In Boston, in 1880, it was found that four per cent. of the male students of the various schools of that city were more or less color-blind. Sometimes this disorder exists in a very slight degree, amounting merely to a confusion between

blue and green, or something of that sort. Occasionally it is found in serious proportions, so that the patient sees nothing in its proper color, but all objects appear to him in a sort of grey. Evidently color-blindness, especially if it exists to any serious extent, must interfere very greatly with all lessons that involve color. To test for this disorder, take a large number of cards, or skeins of wool, representing all the principal colors, as well as a good many of the shades of each color. Place these before the pupil in an indiscriminate heap, and ask him to assort them into groups, *i.e.*, putting all the reds in one place, the blues in another, etc. If he does this without error, or with no serious error, he is not color-blind.

If you suspect any pupil of defective hearing, take him into a quiet room, ask him to close his eyes, then hold your watch opposite his right ear, a couple of feet away. If he hears it tick at that distance, remove it further away until you have determined the greatest distance at which he can hear the sound. Repeat the test on the left ear, and compare the results with those obtained from similar tests applied to several pupils whom you have no reason to suspect of defective hearing. If you find him defective, give him a seat where he may have every possible advantage in the way of hearing.

Adenoid growths and catarrh not only interfere with the senses of hearing, smell and taste, but lower the child's general vigor and acuteness, and thus handicap him in every direction. The same may be said of decayed teeth, through their influence on the digestive organs. The parents should be urged to consult a physician, and have such things remedied.

Not only should the teacher keep a sharp lookout for disorders and defects in the sense organs of his pupils; it is no less important that he should understand what I may call their peculiarities of sense-perception. To explain more fully: There are striking differences in the relative contribu-

tions of the different senses to the material of thought; and these differences seem to depend entirely on some original peculiarities in the nature of the person, for which perhaps no explanation can be given. In some persons the eye furnishes so large a part of the material of knowledge as to overshadow all the other senses; while in others the sense of hearing plays, comparatively, a far more prominent rôle. The former are said to be eye-minded, or to belong to the visual type. In all their thinking, whether it be memory work, creations of the imagination, or abstract thought, as in mathematics, they constantly help themselves out by means of visual images of the objects concerned. In performing arithmetical calculations, each figure takes its place in an imaginary line, in spatial relation to the other numbers.* The other class is said to be ear-minded, or of the auditory type. Objects are habitually associated with the sound of their name, instead of with their appearance or spatial location. Will not the teacher be far more likely to succeed with his pupils, if he understands the type to which each child belongs in regard to sense-perception, especially in the case of those who belong in any pronounced way to some one type? On the one hand he will avoid the mistake of appealing solely to the ear in dealing with the difficulties of a pupil who is strongly of the visual type; and *vice versa*, of confining himself to illustrations of the visual sort, in the case of a pupil of a strongly auditory habit of mind. And on the other hand, he will recognize the necessity of training those pupils who are of the visual type, in ear-mindedness, and those who are of the auditory type, in eye-mindedness; in order that his pupil may be trained in every direction, so far as possible, and on all sides of his being. Of course, what has just been said of hearing and vision is equally true of the other senses, especially of the

*See Galton's *Inquiry into Human Faculty*, Appendix on Number-forms.

muscular sense, which plays so prominent a part in the education of every child.

It may be admitted that there are difficulties in the way of determining this question of the sense-types. But to an observant teacher, these difficulties are not insuperable. He may take it for granted, in the first place, that the children who show unusual proficiency in drawing, are not deficient in visualizing power; that those who have a good ear for music, and sing well, are probably auditory (though, of course, they may be also good visualizers); and that those who are particularly active, and much inclined to emphasize and punctuate what they say by gestures, are not devoid of images connected with the muscular sense. But he may do more than this. In explaining difficulties for his pupils, he may observe that some children in the class are evidently greatly aided by an illustration that appeals especially to the eye; others, again, by such as appeal to the ear. The former should be noted as belonging to the visual type, the latter as belonging to the auditory. Or again, if the teacher himself be of the visual type, he may say to his pupils: "When I count up to a hundred, the numbers seem to arrange themselves before my eyes in a line, thus": (drawing on the blackboard a representation of his own "number-form"), "how do they arrange themselves with you, when you count?" Those who have number-forms will understand at once what he means, and will make drawings of those forms; while the rest will fail to understand what he means by "numbers arranging themselves in a line." The former are visualizers, the latter probably not so; at least, not so much so. Again, ask a pupil to describe Niagara; it will be evident from his description which of the senses has played the most prominent part in his observation of the scene.

To prevent misapprehension it should be added that in all normal children, all the senses contribute to the activities

of knowledge. This question of the sense-types is one of degree, not of kind. It is a question merely of the relative prominence of the senses in the elaboration of knowledge. In some children visual ideas are relatively more prominent; in others, auditory ideas; but probably in no normal child does any one order of images dominate knowledge to the exclusion of the other orders. All children are absorbed in the impressions coming in through their senses. Introspection, self-consciousness, and abstract thinking are, roughly speaking, in direct proportion to the age of the individual; while passive submission to the bombardment of the sense-world, is in inverse proportion.

VII.—PERCEPTION:

In dealing with the senses, we have of necessity had something to say of perception and representation. These may therefore be the more quickly disposed of here.

Perception is the active side of sense-experience. It is the mind's interpretation of sensations, as signs of a present reality. In other words, the child's mind receives a sensation of color by way of the eye, a sensation of taste by way of the palate, one of smell by way of the nostrils, and one of touch by the skin of the fingers. In themselves these sensations do not constitute the reality of an orange; but the child's mind interprets them as signs of such present reality, and perceives the orange as "now and here." Now suppose it were possible for you to present to the pupil an object absolutely new to him; absolutely different from anything he has ever known. How much knowledge would he obtain from a first view of it? Of course, such a thing is not possible; for every object you present to him must have some color, and so link itself to that whole realm of color-ideas which even the youngest school child already possesses; it

must have some form, some weight, etc.; and in respect of each of these qualities it is already, to a certain extent, familiar. But suppose you present an object that differs as widely as possible from anything previously known to him. Let him merely see this object at a distance as great as the whole length of the school-room. Ask him to tell all that he can about it. Then let him come closer, touch the object, handle it, bring as many of his senses as possible to bear upon the examination of it. Then ask him to tell you what he can about it. Note whether, in his description, he makes the largest possible use of other knowledge already in his possession. Note also that, in telling you what he has learned about the object, all the terms he employs are general terms, and not particular terms.; *e.g.*, he may say the object is "small," "round," "smooth," "dark green," "sour," "like an olive." Are any of these terms particular? No; they are general. If your pupil were devoid of general notions, could he ever gain a knowledge of a new object through sense-perception? But whence come these general notions? Are they conveyed into the child's mind by the senses? No; the senses can convey nothing but the particular impression. The general notion is constructed by the mind itself, which instantly brings each new sensation under these categories of thought, and so makes knowledge of it. If this be true, does it not follow, on the one hand, that objects should be constantly brought, in the fullest possible way, within the range of sense activity; and on the other, that every encouragement should be given to the child to exercise his own self-activity of thought in the acquisition of a knowledge of those objects? And if it be true that in learning to know a new thing, your pupil is constantly going back and drawing upon that knowledge which is already his, will it not be greatly to your advantage to know, approximately at least, how much knowledge he possesses when he comes under your instruction? And you

may know this, if you will acquaint yourself with the circumstances of his earlier childhood, and put to him a few carefully selected questions with regard to the qualities of familiar objects.

VIII.—MEMORY:

To remember a thing is to retain the impression made by it in sense-perception, to reproduce or recall it when required, and to recognize it, or reinstate its apperceptive relations. Now, if the thing is to be retained in the memory, it must be thoroughly received in sense-perception. And a prime requisite of this perfect reception of the thing is attention, as every teacher knows. And attention, in turn, depends on several conditions. Physically, there must be vigor and freedom from fatigue, as far as possible. Mentally, there must be interest in the object. Observe whether your pupil manifests all the outward signs of alertness, or whether he seems fatigued and listless, with a dull expression in his eye, drooping form, indifferent demeanor. Perhaps, instead of taking recreation at recess, he remains in the school-room, or sits reading a book in some quiet corner. Observe how he spends his recess, and encourage him to spend it in play. Then observe, in presenting a new object, whether each member of the class is interested. If one pupil betrays a lack of interest, try again, presenting the subject from a different point of view, and, from your knowledge of that pupil's predominant interests (for you have studied him, and know what his interests are), seek to connect the subject in hand with something in which you know him to be interested. Then you will gain his attention, and the subject presented will be understood, retained, and readily recalled.

Does your pupil remember a thing best by its spatial location, or by its logical connection with something else? *E.g.*,

in recalling Cromwell's words when expelling the Long Parliament, does he say "I know these words occur on the left-hand page of my history, near the top," or does he seek to connect the incident with the events that led up to it? Which is the better of these two forms of memory? If you find a pupil excessively prone to a merely local memory, what can you do to cultivate in him a logical memory?

IX.—IMAGINATION:

Do you find that all the pupils in your school are alike in respect of the imagination? If you have studied them, you have discovered that some are strongly gifted in this respect, while others are very slow to conjure up images in the phantasy. Children of the former sort are apt to be proficient in lessons on literature, poetry, history, geography, and the like, and possibly somewhat dull in arithmetic, though this is by no means necessarily the case. But the child gifted with an active constructive imagination, reveals himself probably at his best in play. Observe your pupils on the play-ground; take notice of the make-believe that enters into their amusements, and note how some pupils seem to be leaders in this respect. Some are master-hands at story-telling, while others seldom invent a situation or weave a plot. Tell a story to all the children together, and then, on the following day, ask them to write down the story from memory. Read these written reproductions, and observe how some pupils are strong in literal reproduction, giving you back your story with surprising accuracy; while others, perhaps somewhat deficient in memory of details, will enlarge upon your story, weaving about the nucleus of remembered material a veritable halo of romance.

It is well, too, in memory training, and in cultivation of the imagination, as well as, in a lesser degree, in the educa-

tion of all the other faculties, to take notice of the forms of association of ideas, that appeal most strongly to the pupil's mind. Here again you will probably find individual differences of an interesting sort. One child may be especially sensitive to resemblances, another to differences, another to spatial or temporal contiguities, etc. The teacher will find it greatly to his advantage to take careful note of all these things.

X.—DISCURSIVE THINKING:

Nothing is more interesting in the development of the child-mind than the growth of the power of thinking in concepts and general notions. We have seen how the general notion lies implicit even in the activity of sense-perception. As the powers of mind unfold, however, the general and conceptual becomes explicit. Judgment and reasoning become conscious activities. The order and direction of progress here are of great importance. Ask your pupils to define a number of familiar objects, as knife, house, horse, railway, and observe what qualities are prominent in the child's mind, as shown by the definitions. Does he think chiefly of the material out of which the thing is made, the class to which it belongs, or the purpose which it is intended to serve? Do you not think it worth while to learn in what order the qualities of objects tend naturally to impress themselves upon the mind of childhood? Will not this give you some clue to the best order of procedure in the work of instruction?

What are the fallacies of thought to which you find the average child most susceptible? When he believes a thing on insufficient evidence, in what particular is the evidence usually insufficient? Do you find him too ready to accept statements on the authority of older persons, or of books, without inquiring into the character of such authority? Do

you look upon this as altogether undesirable in a young child? Do you find that he looks upon his parents as practically omniscient and infallible? Do you think it would be wise to interfere in any way with his filial confidence? Do you find that he argues a great deal from analogies, and often very loose analogies? Does he apparently take it for granted that the future will resemble the past, and the unknown the known? At what age does he finally get rid of the illusion that because his pet dog is gentle and harmless, therefore all dogs are so? (A child who had had but two teachers, the one a cross person who happened to be small of stature, the other a kindly teacher who was tall and thin, declared that he was sure the new teacher who was coming to take charge of the school would be cross; and when asked for his reason, said he had seen her and she was small). Do you find that in classifying objects he proceeds according to their relation to other objects, rather than according to the qualities they possess? A careful study of your pupils in regard to these and a multitude of other things connected with mind growth, will greatly assist you in the work of teaching.

XI.—EMOTIONAL CHARACTERISTICS:

If the teacher is to deal skilfully and successfully with the growing child, he must understand him as fully as possible as regards his sensibility or emotional disposition. And perhaps nowhere else will the teacher find so much individual difference as here. And certainly nothing else is more essential to successful discipline, than a thorough acquaintance with each pupil in this respect. If all children were alike emotionally, then possibly one and the same method of discipline might do for all. But such is very far from being the case. We have all varieties, from the child who seems to have no nerves, to the one who seems to be composed of but

little else. The stoical and the hysterical are equally undesirable types of child character. With the view of softening a little those who are too stoical, and hardening a little those who are too sentimental; with the view of chastening and purifying the emotional nature of all the pupils, it is of the utmost importance that the children should be carefully studied. Inquire of the parents as to any special emotional characteristics or experiences of early childhood. Has the child shown any unusual sensibility, and if so, in what special direction? Does sweet music move him to tears, or lively music set him dancing? Does he manifest particularly strong affection for human beings or for animals? Is he easily frightened, say of thunder and lightning, of an approaching locomotive, or of the dark? Has he ever been badly frightened in childhood? Is he naturally selfish or generous, truthful or deceptive, modest, or bold and vain? Has there been anything in his early home training to foster in a special way any of these traits, bad or good? *E.g.*, perhaps he is an only child, of whom his parents are inordinately and foolishly fond; and perhaps they are in the habit of recounting to every visitor his clever sayings and doings, in his presence. Possibly, on the other hand, his treatment at home has been just the opposite of all this, so that his personal pride and self-respect have been too effectually repressed. Your treatment of him ought to be carefully adjusted to all these circumstances. Take special notice of his temper. Observe in what spirit he receives any rebuke or punishment from the teacher, or any interference from the other pupils. Does he bear a little teasing in good humor; or does he fly into a passion; or does he come weeping to the teacher, to complain of his treatment; or does he go away by himself and brood over his wrongs? Observe whether he is sociable or reserved with his fellow-pupils. Does he stay by himself a great deal; or does he mingle freely with his companions? Does he

seem to be a general favorite; or has he only a few (very intimate) friends; or does he appear to be generally disliked? Above all, does he appear to be a recognized leader, with extraordinary influence over his companions, or does he appear to be a mere follower of someone else, always waiting for the initiative of another? Is he easily influenced by the opinions of others? Does he always agree with the last person who talks with him; or does he have strong and independent opinions of his own? The teacher's whole method of discipline should be determined very largely by the answers to these and other similar questions.

XII.—THE WILL:

As there are differences of emotional disposition, so there are peculiarities of volitional development. And the two sets of peculiarities are apt to be parallel in certain respects. A comparative bluntness of the sensibility is likely to be accompanied by a certain slowness of movement; general obtuseness lying at the source of both characteristics; while a somewhat sharp and sensitive temper is the frequent accompaniment of a quick and vigorous will. If you observe your pupils, you will find some that obey your commands almost before they are uttered; while others, equally obedient in spirit, exhaust your patience by their slowness. In the former case, do you find that the pupil hurries off to do your bidding without waiting to comprehend fully what your wishes are? In the latter case, do you find that any attempt to hurry the child results only in confusing him? Observe how far you may hurry him without throwing him into perplexity and preventing obedience altogether. In this connection it is well to notice whether he is of the sensory, or of the motor type of mind; *i.e.*, whether he is absorbed in what he sees and hears, so that he forgets for the moment to

move; or whether he is so constantly keyed up for movement that he is oblivious to many sensations which are noticed by others. Notice, too, what is the natural order of muscular control. Do you find, for example, that the youngest pupils are able to make delicate movements accurately with the finer muscles, such as those of the fingers; or do you find that these develop later than the large muscles, such as those of the trunk, head, and whole-arm? If you find that the order of control is from the larger to the smaller muscles, what conclusion would you draw from this, as to the best method of teaching such subjects as drawing and writing?

What sort of work do you find causes your pupils in general the most fatigue? In the arrangement of your timetable, where do you put these subjects? Are all your pupils alike in this respect? Or do you find that some are at their best early in the day, while others appear very dull in the morning, and do not reach the summit of their vigor until toward noon, or even the middle of the afternoon? Do your pupils do good mental work immediately after meals, or after recess? Or do some pupils show extreme heaviness after eating, or a sort of nervous exhaustion after play? Some children sit still during recess; do you encourage such to play vigorously? And if they do so, are they the better for it, or the worse? At what time in the day do you get the best attention from the average pupil? And to what subjects does each child give most attention? Do you find great individual differences here? In your observations of each pupil, note carefully whether he is of the imitative, reflex type, doing what he sees others do, or whether he shows originality of disposition, and a tendency to strike out in new paths for himself.

XIII.—MISCELLANEOUS TOPICS:

In the preceding, a great deal has been omitted which the interested observer of children will not overlook. As these remarks are intended to be suggestive and not exhaustive, this was necessarily the case. Indeed, it is far better that the teacher should not be told of everything for which he should be on the alert; but should be left with abundance of scope for the exercise of his own originality in the study of his pupils. One or two remaining topics may here be mentioned in closing.

There are times when children grow much more rapidly than at other times. Do you find that mental vigor is in direct proportion to bodily growth, or in inverse proportion? At what age do you find the greatest self-consciousness; the most thoughtfulness; the greatest sentimentality; the strongest inclination to ask questions about God and the supernatural? At what age do children manifest most interest in tales of adventure? Note the difference between boys and girls in all these respects. When do they show inclination to read novels? When are they most superstitious? What superstitions do you find most common among them? What legends are rife among them, as to ghosts, fairies, witches, dreams, cures, (*e.g.*, for warts, toothache, etc.,) falling stars, howling dogs, etc.?

At what age does your pupil manifest the keenest moral sensibility? Is he truthful, and if so, with what motive, so far as you can judge? Is it from fear of punishment from the Divine Being, in the present or future life, or simply because it is right to tell the truth, and wrong to tell lies? If he tells a lie, what is the apparent motive? Does he ever tell the heroic lie, *i.e.*, assume blame for some act which he did not commit, in order to shield the real offender from punishment?

What are his ideas about God, the soul, and the future life? At what age is he most inclined to serious thoughts in regard to these things? When do you find him most ambitious with regard to the present life; planning and dreaming about his own future, what he hopes to do and be when he grows up? Do you notice that the period of greatest religious inclination is coincident with that of the strongest ambitions and hopes regarding the present life; or are the two tendencies separated in time, and in a measure incompatible with each other?

Finally, in your observation of the child, you will discover what are the lines of least resistance in his training and development. But this does not necessarily imply that your work as a teacher shall consist solely in following those lines of least resistance. Let it never be forgotten that where the line of least resistance would mean one-sided or vicious development, it becomes the duty of the teacher to follow the line of greatest resistance, even though that way be arduous, and progress along it slow and painful. For in the last resort your work must be judged, not by the amount of lore which the pupil has acquired, but by the strength of character which he has developed.

